	Route to	See page
1		
2		
3		
4		
5		
6		

1920—Thirty Years of Service to Construction—1950

Contractors and Engineers Monthly

Vol. 47, No. 2 FEBRUARY, 1950 $3 a Year, 50 Cents a Copy

Covering the Field

● Stabilized-Base Work

Cement, gravel, and water, mixed in an asphalt pugmill and machine-spread, form the base of an Ohio secondary road (page 1).

A new graded alignment in the North Dakota badlands gets a road-mixed gravel base. Page 18 covers the job.

● Construction Industry, 1950

For trends shaping up in 1950, see the news department on page 2.

For a forecast of public-works construction volume, see the article on page 35.

● Concrete Floor for Lock

A pair of pavers charge a pair of buckets handled by a pair of cranes to build the 6½-foot slab—page 5.

● Progressive County

There's no mud on truck or auto tires in Boone County, Iowa—not with a 900-mile surfaced road system. See page 11.

● Building Construction

Page 22 follows the construction of a multi-building paper mill down south.

Page 64 tells how steel piles are driven to bedrock to support the foundations for U. N. buildings in Manhattan.

● Bridges—Across Country

In New Jersey, a 167-foot prefabricated railroad overpass—page 26 covers the two-stage placement.

At Memphis, the largest vehicular structure across the Mississippi—page 39 gives details on approach work, too.

In New Mexico, two steel and concrete bridges across the Pecos River—the camera records steel work, page 84.

● Bituminous Paving

Hot-mix, on a granular base, boosts the traffic capacity of an interstate route, as told on page 29.

Black-top, over a clay base and a beach-sand sub-base, surfaces 8 miles of scenic coastal route, as told on page 79.

● HRB and AED Meet

Turn to page 48 and sit in on the 29th meeting of the Highway Research Board.

Or turn to page 100 for a look at some of those who attended the AED meeting.

● Dredge Strips Dam Site

A gold dredge has been uncovering the Canyon Ferry Dam site prior to river diversion. Page 54 traces operations.

● Concrete Paving

A 9-inch reinforced-concrete pavement is laid on a 6-inch slag base course. Full story on page 61.

● Crusher Spews Aggregate

The plant described on page 71 was contractor-assembled. It delivers 2,000 tons of hard rock every 8-hour shift.

● RR Tunnel Lined

The 7,200-foot bore permits the Burlington railroad to skirt the reservoir at Boysen Dam. Details on page 74.

● Winter Maintenance

An important phase of follow-up work in this district is the control of traffic loads. Page 90 tells how it's done.

(You will find "In This Issue" on page 4)

A reinforced-concrete lining completes the 7,200-foot railroad relocation tunnel at Boysen Dam. Here Blaw-Knox forms are in place for a tunnel arch pour, with the reinforcing-steel jumbo beneath. Two 75-foot pours per week, with each of two sets of forms, was the goal. The Morrison-Knudsen job story appears on page 74.

Cement-Treated Base For Secondary Road

Cement and Gravel Are Mixed in Pugmill, Then Laid as 6-inch Rolled Base for Asphalt Surface in Ohio

✦ THIS past season, the Ohio Department of Highways constructed a type of secondary road having a cement-treated base course in which cement, gravel, and water were mixed in an asphalt pugmill, and then laid on a prepared subgrade by self-propelling spreading machines. This construction was tried out on State Route 37, in Licking County, starting at the village of Granville and running south for 2.7 miles. The cement-treated base (CTB) was covered with one 1½-inch-course surface of asphaltic concrete.

A contract for the construction was let by the Ohio Department of Highways in December, 1948, to C. F. Replogle of Circleville, Ohio, on a low bid of $294,676. Besides the usual grading, drainage, and paving items, the contract included the building of a 195-foot bridge. Work on the project got under way the end of March, 1949, and the road work was completed by fall. The bridge was finished during the winter months, delays in the delivery of materials slowing up progress on the structure.

The prime contractor handled the grading and drainage features of the job, while the bridge was constructed by the Beachview Construction Co. of Columbus, Ohio. The base and black-top paving were laid by the Newark Asphalt Co. of Newark, Ohio, 6 miles east of Granville.

Reconstructing Gravel Road

The existing State Route 37 which was improved was a traffic-bound gravel road of variable width, but not

(Continued on page 97)

MULTI-BUILDING PAPER PLANT

Coosa River Newsprint Co. Photo

Workmen rivet the last steel members in the machine room of a plant constructed for the Coosa River Newsprint Co. of Alabama. F. E. McGraw and Daniel Construction Co. were general contractors. See page 22.

NEWS AND VIEWS

of the construction industry at home and abroad -- volume and trends, state and Federal legislation, labor and materials, people

With 1950 a month worn . . . no longer in such unnatural press or so binding at elbow and knee . . . now seems to us a likely moment for appraising its fit on the construction industry. We thought we might even make a monthly habit of such an appraisal, allotting this page to it regularly. If you'd care to take part . . . and we'd like to have you do so . . . address your letters to the News and Views Department of this magazine.

So far, '50 promises to sit well on the industry. The seams look sturdy, the material durable, and the cut comfortable . . . pretty much in the style of '49. Figures for that year are still incomplete, but the total value of construction, both private and public, exceeded $19 billion and topped 1948 by 3 per cent. The Commerce Department predicts at least a ditto showing for 1950 . . . with a probable drop in private construction outlays offset by a rise in public. (For the General Services Administration forecast, turn to page 35 of this issue.) **Costs may swing up a bit** this year . . . the new steel price and wage increases shoving them . . . but will average about the same as in '49. **Material and labor supplies are generally meeting demand.**

As for building construction, capacity output is the trend for 1950 . . . at stabilized costs, now that contingency items no longer harass contractors making lump-sum bids. The industry's efficiency has climbed 20 per cent since 1948, says D. B. Neiderlander, President of the Buffalo contracting firm of John W. Cowper Co.

About 1,000,000 homes went up in 1949, and 1950 will be another banner year, the Johns-Manville Corp. reports. But the industry must gear itself to turn out a finished home package more in line with the prospect's pocketbook. New concepts of design and engineering will help pare costs in 1950, predicts B. S. Gruzen of Kelly & Gruzen, architects and engineers.

Finally, an important postscript to the building picture . . . the President of the American Institute of Steel Construction holds that in 1950 **shipments of structural steel will equal those of 1949** . . . perhaps exceed them by 5 to 10 per cent.

With maintenance and construction costs lumped, total Federal, state, and local spending on roads reached $3 billion last year. **Highway construction is expected to hit $1.9 billion in 1950** and $3 billion in the next three or four years.

The money to do the job? Aye, there's the rub. But suggestions are in the air. As you know, the **AASHO has recommended to Congress $810 million of Federal Aid annually** on a 75-25 basis for the interstate system (see our January issue, page 15). However, Deputy Commissioner Jorgensen of Connecticut estimates total U. S. street and road construction needs at $4.4 billion annually for a 15-year period . . . and urges a Federal-state program for the F-A system of about $1.59 billion a year as against the current program of $825 to $850 million. To speed construction of the 40,000-mile national system of interstate highways, **St. Clair of the BPR recommends bond financing** which would make it possible to complete the network in 8 years, he says, instead of 20 years needed under a pay-as-you-go plan.

To help foot the bill, **motor vehicle owners forked over $3.7 billion in special taxes in '49,** or $300 million more than in 1948. This year they will pay out about $1.23 billion in Federal excises . . . $1.45 billion in state gasoline taxes . . . $810 million in state vehicle registration fees . . . and $195 million in special local taxes. Motor fuel taxes were upped in 16 states in 1949; tax increases were proposed and defeated in 17 states.

During 1950, highway user groups will continue to press for repeal of emergency Federal automotive excise taxes . . . and **they will intensify their campaign against diversion of highway funds** for non-highway purposes. (Though 21 states completely or partially prohibit diversion, $189.37 million was diverted in 1948, the BPR reveals—or 11 per cent more than in 1947.) **Toll roads will probably increase in number this year** . . . despite considerable opposition from the BPR and highway user groups.

Current target for rebuke is the trucker. As Indiana Commissioner Hadden puts it: "Indiana cannot continue to build roads at public expense to provide for the staggering increase in truck transportation." Long-distance hauling by truck should be restricted to "urgent" products, he says. Highway officials generally are resisting any move by truckers for increases in weight limits beyond the 18,000-pound single axle and 32,000-pound tandem axle standards now advocated by the AASHO and the BPR. (See our report of the AASHO meeting in the November issue, page 1 . . . and in this issue, page 90, our story of how Minnesota controls load limits.) "A railroad plot against us," moan truckers.

To document this national picture somewhat, let's glance at a few reports from individual states. For **Michigan,** 1949 was a record-breaker . . . with $33 million worth of projects completed on the state trunkline system, $3.6 million on the state-supervised county roads. But the Department cannot use $20 million of F-A funds available because it has no funds to match . . . it will have to curtail construction from now on unless funds are increased. **Oklahoma** foresees a $45 million program for 1950 . . . the truck load limit law it enacted in 1949 produced more than $100,000 of revenue the first six months it was in effect (operators pay $5 for every 1,000 pounds above a 60,000-pound maximum). **Iowa** expects to let $16 million worth of primary road contracts this year and $15 to $16 million worth of farm-to-market roads. **California** spent $64.5 million in 1949 and plans to spend $63 million this year to improve state highways and build 86 bridges. Its construction-cost index—187.9 for the third quarter of 1949—had dropped 13.3 per cent below the post-war peak. Average number of bidders on state projects was 7.4. **Indiana** will spend $5 million on new bridges this year . . . but groans that it would take $100 million to replace all its substandard bridges. **Mississippi** pored over its highway needs during 1949 and found nearly half its 60,580 miles of rural roads deficient . . . a special session of the legislature summoned to act on a proposed long-range program passed enabling legislation in December but deferred until the 1950 session action on a gas tax increase to finance the program. **Florida** will spend $73.8 million on county-administered state-designated roads during 1950.

In short, the 1950 fit looks generally good, but with something of a strain across the wallet pocket for the road builder. A little easing at the seams would do no harm. We think it a hopeful sign that highway departments, through their public-relations departments, are beginning to take their finance dilemma to the people . . . and that road-building has broken into print in general magazines like ***Fortune*** and ***Life*** . . . you saw those year-end issues, didn't you?

And while we're touching on public relations, did you see ***Look's*** salute to a contractor in its first issue of this year? . . . Clifford S. Strike, President of F. H. McGraw & Co. and Overseas Consultants, Inc. . . . applauded for his support of President Truman's Point Four Program to export American engineering and technical know-how to backward countries. **The year 1950 may well see increased prestige and increased responsibility for the engineer and contractor.**

That's all for now. See you next month, same page. And remember . . . the News and Views Department welcomes ***your*** news and views.

Castelo do Bode, an arch-type dam on the Zezere River, will help to provide electric power for basic industries in Portugal. One of four dams to be built along this river by the Zezere Co., it will probably be completed this year.

A New Soils Text By British Authors

Reviewed by: JOSEPH S. WARD, Jr., Civil Engineering Staff, The Cooper Union

A new text treating the theory and application of soil mechanics has been prepared by two British engineers, P. Leonard Capper, Senior Lecturer in Civil Engineering, University of London, University College, and W. Fisher Cassie, Professor of Civil Engineering, University of Durham. Entitled "The Mechanics of Engineering Soils", the new work presents an unusual viewpoint of soil mechanics.

The approach of the authors, while basically the same as that of writers in this country, is primarily directed to the identification, classification, and determination of physical and strength properties of soils peculiar to Great Britain. For example, the concepts of shrinkage limit and moisture equivalents are passed off as having little relation to British soils. Apparently several classification systems used in this country are also of small consequence when considering soils in Great Britain.

With the object of gathering together the known facts and theories of soil mechanics, the authors have drawn upon their own study and experience, and the experience and writing of other engineers. The book explains the basic principles of soil mechanics, describes the more usual tests, and introduces the reader to some of the practical applications of the subject. A good deal of attention is given to practical applications—a service not too often rendered to fieldmen by the presently available texts. Applications are carefully integrated with soil theories, for proper understanding of foundation problems.

The book covers the definition and scope of soil mechanics, classification of soils, soil moisture, compressibility and consolidation, shearing resistance, earth pressure, stability of slopes, stability of foundations, settlement of foundations, pile foundations, roads and runways, drainage problems, site exploration, sampling, and testing. The treatment of permeability and consolidation is a bit too abrupt. Though many of the subtopics are short and receive a minimum of explanation, the text is on the whole well written and may be used by experienced engineers as a valuable reference work.

This book may be obtained from the McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 18, N. Y., at a cost of $4.00.

Building Research Plans Announced by the BRAB

Six projects to serve as the basis of a 5-year program for the Building Research Advisory Board, recently set up in the National Research Council, have been announced by William H. Scheick, Executive Director.

The six projects, which will begin immediately, are: (1) A survey to develop a list of problems in the building industry susceptible to solution by research. (2) Conferences to bring together persons and agencies actively engaged in research along connected lines in order to correlate future study. (3) An analysis of the present status of building research. (4) A program of assistance to government agencies concerned with building research. (5) Cooperation with builders' and contractors' associations to promote field tests and demonstrations of research results. (6) The development of an effective program of publication and information.

These projects will be expanded as soon as additional funds and personnel are available, so that the BRAB can serve as a clearing house of information on building problems.

Help insure America's security and your own. Buy U. S. Savings Bonds.

How's Your Spanish?

Have any engineering problems in Spanish America? Know when to call a concrete mixer *hormigonera* or *mezcladora*—or maybe *revolvedora, terceadora, concretera,* or *betonera*? All six words are given in the revised edition of Louis A. Robb's "Engineers' Dictionary, Spanish-English and English-Spanish", recently published by John Wiley & Sons.

Mr. Robb's book contains over 75,000 terms used in everyday practice by civil, mechanical, and electrical engineers—an increase of 70 per cent over the previous edition. Based on current engineering periodicals and textbooks in both English and Spanish, it gives special attention to engineering phrases that cannot be translated on a word-by-word basis, as well as variations peculiar to certain localities.

The second edition sells for $12.50 and can be secured from the publisher at 440 Fourth Ave., New York 16, N. Y.

Utah Conference Papers Are Published in Booklet

The proceedings of the tenth annual Highway Engineering Conference sponsored by The University of Utah have now been published. Reprints of 19 papers are contained in the booklet's 200 pages. Copies may be secured by writing to A. Diefendorf, Head, Department of Civil Engineering, University of Utah, Salt Lake City, and requesting Bulletin No. 45. Fifty cents.

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In This Issue

Consider the Motorist

A good example of consideration for the motorist was experienced recently while driving through Pennsylvania. A long line of traffic had been halted, while up ahead a bituminous spreader was putting down a lane of black-top pavement on one side of a highway. The watchman, holding the red flag for one-way traffic, passed out cards to the drivers waiting for the flow of travel to be reversed. These cards, issued by the Pennsylvania Department of Highways, explained the cause of the delay, and advised the motorists that single-lane traffic had been established through the construction ahead to avoid a longer route and greater time-consuming detour around it. The 8 x 5-inch card further stated in a couple of terse paragraphs how much the state was spending yearly on highways, and what the money was being used for.

Here is something that might well be copied by other states as a service to the traveling public. The cost is trivial, but the good will developed in keeping the motorist informed of what is going on is immeasurable.

Where a detour is unavoidable, because of the nature of the construction, some states are now putting on their detour signs the exact mileage of the alternate route. Some also list the towns, if any, through which the detour passes. This is another good example of courtesy to the road user who pays, through his taxes, for the job under construction.

Too often, however, the detour signs merely send the motorist off in a general direction without information as to where he is going or how long the journey. When he reaches an intersection, it often is unmarked, leaving the driver solely on his own from that point on. Only a very small minority, who reside in the neighborhood, may know their way around without guidance.

A few states, too, seem perversely slow in opening new roads to traffic once they are completed. Examples have been cited where long delays have occurred between completion of the contract and acceptance by the state highway department. In the meantime, the detour signs are left up. People in the vicinity ignore them and use the new route, but most of the traffic, uncertain and confused, still blunders along over the detour.

Sometimes a contractor rushes work to complete the pavement, then dawdles along with shoulder and slope trimming while the road is still closed to traffic. If such work does not constitute a hazard to the motorist, he would prefer driving under controlled speeds on a smooth surface to bumping along for additional weeks over a long, tedious detour.

State rules and regulations, of course, determine policy in the latter cases, but more consideration for the motorist when he is confronted by construction on the highway is also in order.

License Plates

Maine has taken a big step forward in highway safety with the adoption this year of automobile license plates made from Scotchlite, a reflective material that seems to glow in the dark. According to the Maine Motor Vehicle Division, the new plates will pick up the headlights of approaching cars over 1,200 feet away. This should help reduce rear-end collisions, and accidents caused by cars parking or stalled without lights on the traveled way. The advantage to the police of these night-visible plates is also obvious.

Bigger Airports

Since the end of the war, and the increasing general use of larger four-engine planes in commercial air traffic, even our newest and biggest airports are now considered inadequate. Long before the tragic crash at Washington, D. C., experts decided that the Washington National Airport, one of the best in the world, was too small for peak traffic hours even in good weather, and fell far short of minimum requirements in bad weather.

This means that many of our older fields need to be rebuilt in order to handle present-day traffic, and that the design and construction of new airports must be considered with ultimate, not existing, traffic standards in mind. Airports need more and more space, away from interfering topography, with longer runways for the larger planes. Naturally, the older airports cannot be moved still further away from the cities that they serve, but if more safety can be secured with a few hundred more feet of runway, then no effort should be spared in making such enlargements as soon as possible.

ARBA Makes Upham Award

The Enoch R. Needles chapter of the American Road Builders' Association, at the Missouri School of Mines, Rolla, Mo., is the 1949 winner of the Charles M. Upham award. To win this award, the Missouri group competed with the 10 other ARBA student chapters.

The Upham award, instituted by the Engineer-Director of ARBA, is presented annually to the student chapter programming the most constructive and beneficial program in connection with highway engineering courses.

Point IV Program Depends On Engineers' Cooperation

At their fall meeting, members of the American Society of Civil Engineers were urged to respond generously in making available their essential services under the President's Point IV Program, which seeks to expand the flow of technical knowledge to underdeveloped areas and to encourage overseas private capital investment. The development phase of this program, said Samuel B. Hayes, assistant to the Assistant Secretary of State, will lean heavily on private United States engineering firms and contractors. And a shortage of available technical experts would seriously limit the scope and development of the program.

The program is a low-cost one, said Mr. Hayes, since exporting technical know-how is not expensive (only complicated) and an increase in private foreign investment is by definition outside the Government budget. But the program is none the less revolutionary, since "the processes of technical cooperation and capital investment are cumulative in effect", and "the judicious application of technical knowledge coupled with investment can bring about, gradually at first and then with snowballing momentum, a revolutionary improvement in the material and social well-being of the world's peoples."

Safety Talks for Foremen On Construction Jobs

Fifty-eight informal safety talks for foremen to use on construction and maintenance jobs have been assembled in a manual and published by the National Safety Council. Written by members of the Executive Committee of the Council's Construction Section, the talks are simple, direct, and thoroughly illustrated with drawings, diagrams, and posters. Foremen should not just read them, the manual explains, but should present them to the men in their own words.

An introduction explains how to use the talks and how to conduct "tool-box" or gang meetings on safety. Talks 1 and 2 are general, and explain the why and wherefore of accident prevention. Talks 3 and 4 deal with protection to the public and barricades. Then comes first aid, personal protective equipment, fire, housekeeping, handling and storing materials, heavy equipment, material hoisting, rope, ladders and scaffolds, falls, electricity, electric tools, power saws, welding and cutting, and transportation of workers.

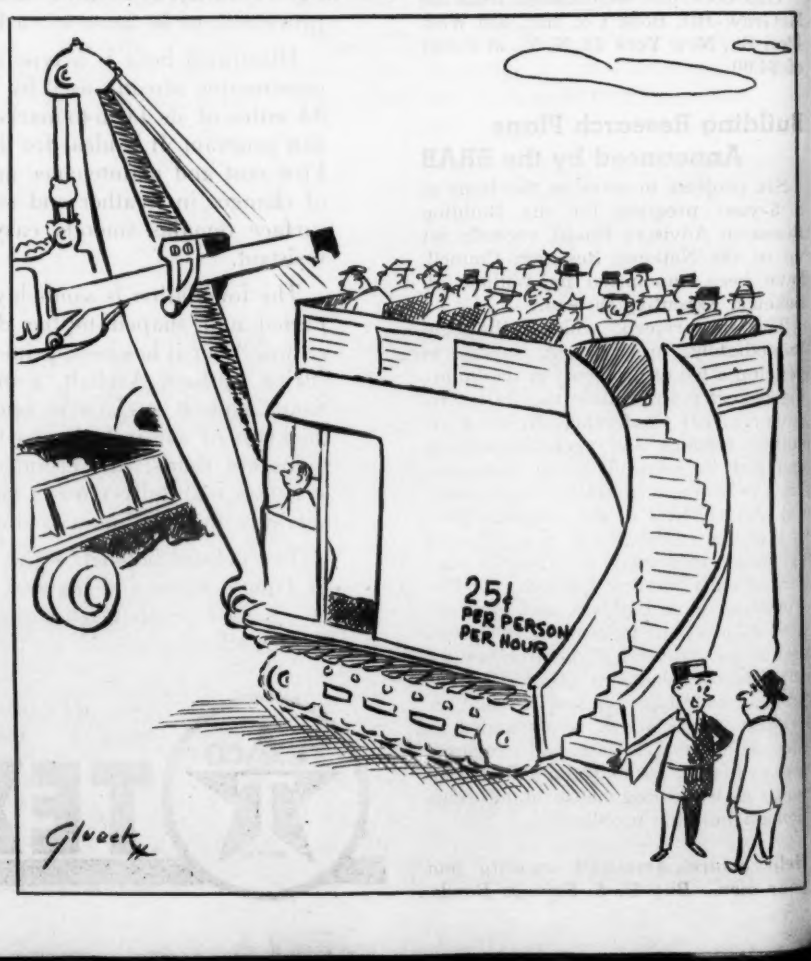
Talks 43 to 58 deal with operations: demolition, clearing, excavation, concreting, steel, blasting, and pile driving.

If you'd like to secure a copy of this manual, write to the National Safety Council, 20 N. Wacker Drive, Chicago 6, Ill. The price per copy is $1.50 for members of the National Safety Council; $3.00 for non-members.

Highway Research Review

The second number of the "Highway Research Review" is now available from the Highway Research Board, National Research Council, 2101 Constitution Ave., Washington 25, D. C.

The Review lists and classifies highway research projects under way or recently reported on by state highway departments, Federal bureaus, universities, colleges, and other agencies. It includes articles and editorials on research, digests of information on specific highway problems, and comments on the national program of highway research and development. The second number of the Review also includes a topical list of the research projects given in the first issue, and of the papers presented at the last annual meeting of the board.



Two 34-E Pavers Mix Canal-Lock Concrete

Discharge Into 2-Yard Buckets Handled by Pair of Cranes; Slab 6½ Feet Thick in Canal Lock

By WILLIAM H. QUIRK,
Eastern Editor

✦ THE Algiers Lock in Orleans Parish, La., south of New Orleans, is taking shape in the bowl-shaped hole that was excavated to contain it. The thick floor slab of reinforced concrete has been completed, and the massive side walls are scheduled to be finished by mid-summer of 1950.

The lock is a Department of the Army, Corps of Engineers project under the direction of the New Orleans District. It is located approximately 10.3 miles below Harvey Lock, at the Mississippi River end of an alternate connection of the Intracoastal Waterway. A 9-mile canal leading back from the lock to the existing waterway will provide the alternate connection. The concrete lock is supported on untreated-timber piles, averaging 50 feet long with 8-inch tips and 12-inch butts, and spaced from 4 to 4½ feet on centers both ways. Their driving and the preliminary work on the lock was described in CONTRACTORS AND ENGINEERS MONTHLY, October, 1948, pg. 17.

Work on the lock floor got under way in August, 1948, after the Corps of Engineers awarded a $1,173,584 contract to Stevens Bros. & The Miller-Hutchinson Co., Inc., of New Orleans, La. Later this same contractor was awarded the contract for the construction of the reinforced-concrete walls on a low bid of $927,442.

Big Lock

The concrete structure has a total length of 1,129 feet 10 inches, with a clear width of 75 feet. The length includes an 800-foot lock chamber between the gates; a forebay or river approach end; and a tailbay or canal approach end. The side walls are 36 feet high, with a 5½-foot width at the bottom. The inner face is vertical, while the outer is battered 2 inches to the foot until a thickness of 2 feet is reached 21 feet above the bottom. The 2-foot width is held nearly to the top, but increases to 5½ feet again in the upper 2 feet of height.

For the foundation, a 12-inch stabilization slab of plain concrete was poured first to a width of 88 feet 6 inches under the lock. Over this went the heavily reinforced concrete floor slab which is 6½ feet thick in the lock chamber and 86 feet 6 inches wide, or stepped one foot in from the stabilization slab along each side. In the gate bays, which go down 3½ feet deeper than the lock floor, the slab is 10 feet thick.

Thus the bottom elevation of the stabilization slab in the gate bays is minus 24 Mean Low Gulf, and minus 20.5 MLG in the lock. The finished floor throughout the structure is at elevation minus 13 MLG, the bottom of the sill. The top of the walls is at plus 23 elevation.

Concrete Plant

For a job involving 34,000 cubic yards of concrete in the floor contract alone, an efficient batch-plant set-up was naturally a must. The plant was established to one side off the Mississippi River end of the lock, and back from the top of the flat 10 to 1 side slopes leading down to the lock. A railhead was conveniently located at the U. S. Naval Station in near-by Algiers which is served by the Southern Pacific Railway. To this siding Jahncke Service, Inc., of New Orleans shipped sand and gravel for the fine and coarse aggregate of the mix. A Koehring 301 crane with a 25-foot boom and a Blaw-Knox 1-yard clamshell bucket unloaded the cars into a fleet of 12 trucks hauling 4 yards each. The sand and gravel were stockpiled at the plant on either side of a Blaw-Knox 100-ton 2-compartment aggregate bin which was charged by a Koehring 502 crane equipped with a 45-foot boom and a B-K 1¼-yard clamshell bucket.

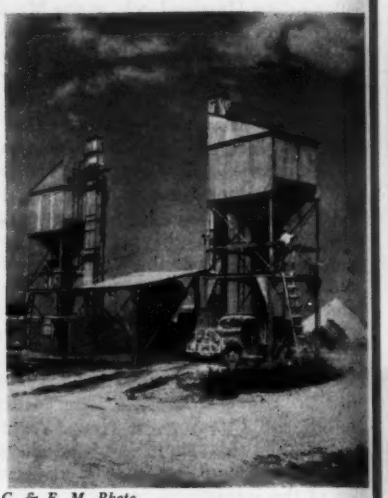
Lone Star cement, Type 2, containing Vinsol resin interground at the mill in New Orleans, was shipped in bulk to the same siding where it was stored in a B-K 1,000-barrel bin. From there it was hauled to the job plant in 2 dump

(*Continued on next page*)

Official Photo, New Orleans District, Corps of Engineers
Looking northeast toward the Mississippi River at Algiers Lock after the 12-inch stabilization slab of plain concrete had gone in.

Official Photo, New Orleans District, Corps of Engineers
Algiers Lock in Orleans Parish, La., south of New Orleans—1,129 feet long, 75 wide. A couple of cranes are placing floor-slab concrete in the gate bay. Stevens Bros. & The Miller-Hutchinson Co., Inc., is the contractor.

C. & E. M. Photo
At the batch plant near by, a truck backs under a Blaw-Knox aggregate bin for sand and gravel. Behind, a Koehring 502 loads the bin with gravel from a stockpile.



C. & E. M. Photo
Then the truck drives under one of two Blaw-Knox 300-barrel cement bins.

Official Photo, New Orleans District, Corps of Engineers
At the job site, the concrete is mixed in two Koehring 34-E Twinbatch pavers with booms and buckets removed. Water is pumped from a canal dug at the river end.

Two 34-E Pavers Mix Canal-Lock Concrete

(*Continued from preceding page*)

trucks covered by metal tops fitted out with a manhole-like arrangement for loading. The trucks held 25 barrels each, and end-dumped their contents at the plant into a hopper that had a worm gear going off to each side. These screws moved the cement to the enclosed elevators on two B-K 300-barrel cement bins, one on each side of the receiving hopper.

From the railroad siding at the naval station to the batch plant the haul averaged 5 miles. Occasionally when the sand showed a deficiency in fines, limestone dust was added to the mix. Limestone dust was also used to suppress the amount of air in the concrete, when interground air-entraining agent caused the air content to run too high. In general the amount of air varied between 3 and 6 per cent, with 4½ per cent considered the optimum.

Job Mix

The dry weights of a typical batch that yielded 37.5 cubic feet of concrete are as follows:

Cement	716 lbs.
Sand	1,370 lbs.
Gravel, 1-inch	2,842 lbs.
Water, 43 gals.	358 lbs.
Total	5,286 lbs.
Air	4.5 per cent

The above proportions are at the rate of 5.48 bags of cement to the cubic yard of concrete, with 5.65 gallons of water

(*Continued on next page*)

Official Photo, New Orleans District, Corps of Engineers
Two cranes, a Koehring 605 and a Bucyrus-Erie 38-B, both with 65-foot booms, lift Blaw-Knox 2-yard concrete buckets to the forms. Here they're at work in monolith 5.

Official Photo, New Orleans District, Corps of Engineers
Steel reinforcing is left sticking 20 feet up in the air along the sides where the walls are to be built. The two outer rows are battered, the inner is set vertically.

per bag of cement. The maximum slump with this mix was 3 inches.

Batches were hauled from the plant in trucks holding two batches each. An average of eight trucks was used during a pour; they backed under the aggregate bin for the sand and gravel, but drove under and through the cement bins on the way to the lock. A combination shell and plank road had been built around the site, and also leading down into the hole. Around the rim of the excavation a ditch was dug and a dike thrown up to restrain water from flowing down the side slopes, and to take care of surface drainage at ground level. After rains the hole was pumped out by a pair of Carver 6-inch electric pumps.

12-Inch Stabilization Slab

Before any concrete was placed, the timber foundation piles were cut off to grade with two Mall power chain saws at such an elevation that they projected 6 inches into the 12-inch plain-concrete stabilization slab. The subgrade was then fine-graded by a Koehring 605 crane using a 65-foot boom and a B-K ½-yard clamshell bucket. The crane covered about half the area, working from the haul road along one side of the lock. Then this half of the slab was laid, and the rest of the site was graded with the crane out of the mud and operating from the concrete.

The 88½-foot-wide slab was laid in strips 22 feet wide running the length of the lock. The only joints were construction joints, put in as needed. Steel road forms and boards were used to hold the concrete which was given only a rough surface finish.

On top of the stabilization slab, the 6½-foot floor slab was laid in monoliths numbered from 1 to 39 beginning at the river end. They cut transversely across the width of the structure, and were broken down as follows to make up the total 1,130-foot length:

3 at 25 feet	equals	75 feet	
1 at 50 feet	equals	50 feet	
1 at 87 feet 5 inches	equals	87 feet	5 inches
29 at 25 feet	equals	725 feet	
1 at 30 feet	equals	30 feet	
1 at 87 feet 5 inches	equals	87 feet	5 inches
3 at 25 feet	equals	75 feet	
		1,129 feet 10 inches	

The only expansion joints in the floor slab were at the gate bays where a ½-inch mastic material was inserted between the adjoining pours.

Pouring the Deep Slabs

The standard 25-foot monolith held 520 cubic yards of concrete and was poured in from 4 to 5 hours. The long gate-bay monoliths contained the most concrete, and of course took more time to complete. They were divided into sections so that the largest pour on the job totaled 775 yards. Work started at both ends and progressed toward the center with the construction of alternate monoliths; the gate bays were done last.

The 6½ and 10-foot slabs are heavily reinforced, and all the steel was procured before the work got under way. Truscon and Republic steel was used, being shipped by barge and rail from Gadsden and Cleveland, Ala., to the rail point and trucked from there to the site, where all bending was accomplished. At the bottom, the slab has a double mat, 4 and 10 inches from the bottom, supported on chairs. At the top of the slab is a triple steel mat, 4, 6, and 6 inches on centers, measured from the surface. Most of this reinforcing is 1¼-inch square bars on 6-inch centers.

Top steel is supported on Richmond hangers suspended by ¾-inch bolts from a structural framework. This framework consisted of two 12-inch channels back to back on 6-foot centers, with their ends resting on horses on opposite sides of the monolith being poured. Thus for a 25-foot monolith the double channels were 30 feet long. The chairs and hangers supporting the reinforcing were left in the concrete, but the ¾-inch bolts were unscrewed at the completion of a pour and pulled from the concrete. The structural steel was supported independently of the forms, and also served as a grid to hold the concrete hoppers.

Two Pavers at Work

Form work consisted of 2 x 6 center match pine, backed by vertical 2 x 8 studs on 18-inch centers, and double 2 x 6 wales set about 5 feet apart. Richmond ¾-inch Tyscrus went through the wales on approximate 2-foot centers at the bottom and 3-foot centers at the top, and were secured to the reinforcing steel. The interior of the forms was coated with paraffin oil.

Concrete was mixed in two Koehring 34-E Twinbatch pavers with the booms and buckets removed. Water was obtained from the canal that had been dug at the river end of the lock. It was pumped direct to the pavers by two Gorman-Rupp 2½-inch triplex pumps through a maximum length of 2,000-foot 2½-inch pipe line. Batches were mixed 1½ minutes, then the concrete

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Two 34-E Pavers Mix Canal-Lock Concrete

(Continued from preceding page)

was discharged into B-K 2-yard concrete buckets which were lifted to the forms by two cranes—a Koehring 605 and a Bucyrus-Erie 38-B, both with 65-foot booms. The pavers worked on the same side of the monolith being poured, along opposite sides of the slab.

Hoppers and elephant-trunk pipe were used until the concrete was 5 feet up from the bottom, at which point the pipe was removed. As the concrete was placed in 18-inch lifts, it was vibrated by Jackson internal vibrators. The hoppers were fitted out with four cables and hooks which permitted them to be fastened to the bottom of the concrete buckets. Thus the crane easily shifted the hoppers about without having to disengage the buckets.

Curing of the concrete was effected with wet sand on top of the slabs and wet burlap on the sides. Forms were stripped after 48 hours. Usually two monoliths were poured during the 5-day work week. Six Kohler light plants, 15 and 20-kw units, were on the job to furnish light and tool power.

Side Walls

Steel reinforcing was left sticking 20 feet up in the air along the sides where the walls were to be built. The reinforcing is in three lines, the inner row being set vertically and 4 inches in from the surface. The two outer rows are battered to conform with the slope of the wall. Spacing is either 5 or 6 inches on centers, and the bars are either 1⅛ or 1¼ inches square. Additional steel will be spliced to bring the reinforcing to the top of the wall.

The walls are constructed in 25-foot sections, with expansion joints between the monoliths. Wood panels were built for the forms, similar in construction to those used in the slab work, except that they were lined with Hydron, an absorptive form lining. The pouring was done from inside the lock with a single paver and crane because of the limitation of space. After the walls are completed, the ground behind them will be backfilled. The second contract also includes the construction of a small gravity dam on piling at the Mississippi River end of the lock.

Marsh Gas

A peculiar thing happened as the stabilization slab was placed. Gas from pockets deep in the marsh began to rise out of the ground, using the timber foundation piles as wicks since they are of a porous material. The gas seeped through the concrete and construction joints, discoloring it in several places. Some brinish water also bubbled out in these areas. In this section of Louisiana it is not uncommon for dwellers on the marshes to drive pipes 60 to 70 feet into the earth and obtain marsh gas which they burn as fuel.

But this situation in the 12-inch slab was overcome by chipping out in the concrete small trenches, 1½ or 2 inches deep x 3 inches wide. A tin roof was put on top and the whole sealed with asphalt to make it both air and watertight. Gas from the bowels of the earth was then led off to the side of the structure through these conduits, before any steel was placed in the deep floor slab.

Quantities and Personnel

The major items in the floor contract lock were as follows:

Subgrade, excavation and fill	6,844 cu. yds.
Pile cut-offs	5,960 ea.
Concrete	33,155 cu. yds.
Cement	44,661 bbls.
Steel reinforcing	7,196,179 lbs.

The wall contract contains the following items:

Timber piling, vertical	11,862 lin. ft.
Timber piling, batter	12,844 lin. ft.
Concrete	15,050 cu. yds
Steel reinforcing	1,125,000 lbs.
Absorptive form lining	96,000 sq. ft.
Cast steel wall armor	190,036 lbs.

At the peak of operations, Stevens Bros. & The Miller-Hutchinson Co., Inc., employed a force of 120 men under the supervision of A. B. Aiken, Superintendent. R. C. Hutchinson of the firm also gave the job his personal attention.

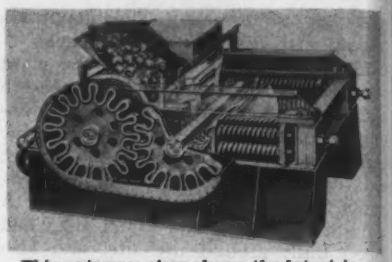
For the Corps of Engineers, Department of the Army, Horace L. Dear is Resident Engineer. The project is located in the New Orleans Field Office subdivision which is supervised by Rupert G. Hodges, Field Assistant. The New Orleans District Office is headed by Col. Charles G. Holle, District Engineer.

C-W Celebrates 70th Year

Chesebro-Whitman Co., of Long Island City, N. Y., is celebrating its 70th anniversary. The company was formed in 1879 to manufacture ladders, scaffolding, and flag poles. Its line now includes steel scaffolding, scaffolding machines, hoisting towers, grandstands and sidewalk bridges.

Crusher Improvements

Improvements in its current line of twin and triple-roll crushers have recently been announced by the Pioneer Engineering Works, 1515 Central Ave., Minneapolis, Minn. They consist of deeper mounting sills with less obstruction from cross members to provide more clearance for conveyors, a deeper top frame, separately cast star gears and driving gears, and cast-steel hubs for the roll shells. Twin-roll crushers



This cutaway view shows the latest improvements in Pioneer roll crushers.

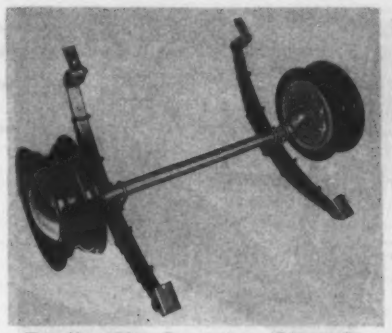
are now available in sizes 54 x 24, 40 x 22, 30 x 18, and 24 x 16. Two sizes of the triple-roll crushers are available: 40 x 22 and 30 x 18.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 130.

New Undercarriages For Mobile Trailers

Complete undercarriage assemblies for the construction of utility trailers are now offered by the Fayette Mfg. Co., Fayette, Ohio. They are designed for manufacturers, public services, contractors, or others who are required to make their equipment portable, or who wish to build a special trailer for some specific transport need. They have capacities up to 6,000 pounds. For heavier loads, spring specifications can be changed or a tandem 4-wheel assembly adapted.

The standard assembly includes: a Fayette True-Camber 4-inch drop-center tubular axle equipped with drop-forged alloy-steel spindles; 2 Fayette Glide-Ride springs complete with rubber-mounted hangers and spring shackles; 2 hub and drum assemblies of the standard automotive type, 15 or 16-inch; and a Warner or Empire electric brake assembly, 12 x 1¾ inches.



Fayette Mfg. Co. makes this undercarriage assembly for the construction of utility trailers.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 146.

Scientific Labs Merge

On January 1 of this year, two of the country's leading scientific laboratories merged: the Esselen Research Corp. became the Esselen Research Division of the United States Testing Co., Inc. The parent company headed by Allen L. Brassell is in Hoboken, N. J.; the new division, however, continues its operations in Boston under the direction of Gustavus J. Esselen, its founder.

Because Radiant Baseboard can be completely and permanently installed before lathing and plastering, it saves the cost of installing temporary heating systems for wintertime building.

Building Heaters Go In at Job Start

The Radiant Baseboard manufactured by the U. S. Radiator Corp., 300 Buhl Bldg., Detroit 26, Mich., is designed to eliminate the inconvenience and expense of providing temporary heat for winter building construction. The heating contractor moves in as soon as the studding is in place and nails a 1 x 10 board to the bottom of the studs with the top of the board 10 inches from the finished floor. The Radiant Baseboard is then mounted on the board and the permanent heating installation is completed in one operation, except for the valve enclosures which are added just before painting.

A sheet of aluminum foil, which is furnished with the baseboard as a backing, has a 4-inch extra width which is folded over the top to keep debris out of the baseboard unit. The edge of the mounting board serves as a plaster ground. In addition to eliminating the high costs of temporary heating installations, the builder gets greater efficiency from his mechanics when they do not have to work around radiators set well out from the wall, it is said.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 30.

Data on Iron-Aggregate Concrete Floor Surfaces

A 36-page illustrated booklet on Masterplate Iron-Clad concrete floors is offered by The Master Builders Co., 7016 Euclid Ave., Cleveland, Ohio. It presents field experience and laboratory tests indicating that the Masterplate floor, with its iron-armored surface about ⅛ inch thick, wears 5 to 6 times longer than a plain concrete floor, also that it is spark-resistant, static-disseminating, non-dusting, corrosion-resistant, and easy to clean. Other features are its availability with a non-slip finish and in eleven different colors. Detailed illustrated directions for laying a Masterplate floor are given—for both new construction and resurfacing old floors.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 51.

Ryerson Expands Plant

Joseph T. Ryerson & Son, Inc., steel fabricator, has completed an 118,000-square-foot addition to its Chicago plant at 15th and Rockwell Streets. The offices of the firm's Concrete Reinforcing Bar Division are located in the new building, which also contains a warehouse for bar and sheet steel and tubular-steel products.

This enlargement of the firm's steel service facilities in Chicago represents the first major construction to be completed in a series of planned expansion and modernization moves which will take in the entire property. It is also a part of the company's overall expansion program which to date has included the establishment of new plants in Pittsburgh, Los Angeles, and San Francisco, and additions to plants in Cleveland and Philadelphia.

Special Lift Truck Handles 4-Ton Pipe

Work on the world's largest-diameter natural-gas pipe line presents some special engineering problems. Cost for this line, which will run from gas fields in Texas and New Mexico to northern California, is expected to exceed $150,000,000. The work entails handling 60-foot lengths of 36-inch-diameter steel pipe which weigh approximately 4 tons.

The initial 80 miles of the 508-mile section being built between Milpitas and Needles in California was contracted by Bechtel-Price-Conyes. Miles & Sons trucked 30-foot pipe sections from San Francisco to Santa Clara, where they were welded into 60-foot lengths. Big problem for the Miles firm was loading these off-size hard-to-handle 60-foot sections onto trailers and truck bolsters for hauling to the right-of-way.

To meet this problem a Gerlinger lift truck with a specially engineered hydraulic grab arm was developed by the Gerlinger Carrier Co. of Dallas, Oreg., in cooperation with its California representative, Burnaby & Williams. The hydraulic grab arm on the Gerlinger lift truck is designed to hold pipe while traveling by providing positive hydraulic pressure on both the forks and the upper grab arm. Where the pipe is lying on the ground, the forks dig in and under as the grab arm comes down to lock the pipe for lifting.

Further information on the Gerlinger lift trucks may be obtained from the company. Or use the Request Card at page 16. Circle No. 54.

A special Gerlinger lift truck handles 4-ton pipe sections for a section of natural-gas pipe line between Milpitas and Needles, Calif.

Engine Improvements

Two major improvements designed to increase power-plant life and afford greater serviceability have been incorporated in the Series 60 engine manufactured by the Federal Motor Truck Co., Detroit 9, Mich. To lengthen exhaust-valve life, rotators have been added to the engine. They turn the valves slowly during operation, insuring more even seating and cooler running.

New interchangeable precision bearings of copper-lead alloy, with an electrically coated inside of lead and tin, have replaced the bronze-backed cadmium-nickel bearings. Design of the bearings is such that the complete assembly can be removed without disturbing the crankshaft. The connecting-rod bearings have also been changed from cadmium-nickel to the new copper-lead type.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 128.

Catalog on Fasteners For Construction Machines

An illustrated guide to the selection of bolts and nuts for construction machinery and equipment is offered by the Lamson & Sessions Co., 1971 W. 85th St., Cleveland 2, Ohio. This handy 10-page booklet includes information on cap screws, lock nuts, plow bolts, washers, tractor bolts, Hi-Nuts, machine bolts, semi-finished nuts, cotter pins, wire-rope clips, pipe plugs, set screws, and U-bolts. A description and illustrations are given for each of the products.

The booklet is titled "Fasteners for Machines That Move Mountains". It may be obtained from the company, or by using the Request Card at page 16. Circle No. 62.

County Emphasizes Road Construction

Maintenance Has Place Too, But 32 New Miles Built During 1948 Helps Keep Iowa County Out of Mud

✦ WE were looking for the most progressive county road department in Iowa. Far down in the southern part of the state several people said, "Go up to Boone and see Phil Saum. He's got the best roads in the state."

The remark was not made enviously. It was made as if those people *expected* Boone County to have the best roads.

Philip V. Saum, County Engineer of Boone County, with headquarters in the courthouse at Boone, Iowa, would be the first person to disagree with the truth of these remarks. He doesn't admit his roads are good—and won't until they have proved up for a longer period of time. But at this writing, Boone County doesn't have a mile of county road on which its people get stuck. The 988-mile system is now all surfaced, with the exception of only 43 miles, and that is graded and well drained.

The balance is all good, hard, stable gravel and crushed rock, laid as straight as possible through some of the finest farmland in the nation. Some of the more traveled county roads have even been given an experimental oiling treatment. While it is still too soon to tell how they will work out, initial results look promising.

The secret of Boone County's outstanding Road Department is the fact that the organization has never been afraid to spend money for construction. The list of Federal-Aid secondary projects on Saum's office desk is lengthy. Residents also paid for the construction of 220 drains over the years, which now carry water from the land down to the Des Moines River, a sluggish stream which flows north and south to bisect the 576-square-mile county.

Organization and Finances

Boone County's affairs are run by a board of three Supervisors, elected at large by the people. A County Engineer in turn directs and plans engineering and construction work, subject to approval of the Board of Supervisors.

The tax and finance scheme for road building has only recently been revised a great deal. Under the old system, the state took a great share of motor tax revenues, giving back to the counties about $4,000,000 out of some $21,000,000 collected. That has been changed. Now all the state revenue from motor-vehicle origination goes to a direct fund, which is then pro-rated to the counties on the basis of area and need.

The current construction-maintenance budget is nearly $500,000. That is derived from the county share of gas taxes, the motor-carrier tax, special revenues, and a direct levy of 8 out of a possible 11 mils on the $33,576,000 assessed valuation in Boone County. Some revenue also comes in from Federal Aid, but the local people pay the biggest share of their road-building costs.

The organization of the Road Department is quite simple. Each of the three Commissioners takes an active part in maintenance work in the three county districts. Main yards are located at Boone, Ogden, and Madrid, where maintenance foremen and their gangs originate the day's work. There are also about five other small sheds and temporary yards scattered over the county.

Saum is in constant touch with the maintenance foremen, but he has enough current construction work and planning under way to keep him and his two assistants quite busy. In addition to the preparation of plans and the

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County Emphasizes Road Construction

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supervision of a county survey party which does the staking, Saum personally acts as his own Resident Engineer in supervising the work of contractors.

For as much of the new construction work as possible is being contracted. All the production of crushed rock and gravel is being done the same way. Maintenance equipment which is temporarily idle is kept busy on small day-labor re-alignment and grade-change work, but these projects are held to a minimum, consistent with keeping equipment occupied.

C. & E. M. Photo
Boone County Engineer Philip V. Saum braves summer heat to inspect a Frink V-plow in the Madrid, Iowa, yard.

Alignment Important

Boone County's policies reflect the ideas of the Supervisors and the County Engineer. They are as important as the methods which are used, if not more so. For Saum, and his Supervisors with him, believe that good county roads are a matter of proper construction, and that construction is a well blended scheme of location, design, and field work.

Location, in Saum's estimation, is very important.

"If you locate a road right, you can whip a lot of your troubles before they start," he explained. "You can take advantage of native materials, you can duck floodwater, and you can build highways which will practically clean themselves when it snows. That's important in this county."

The master road plan of the county, consequently, looks like a grid system laid out by surveyors. Many of the roads are on tangent alignment. Most of them are on the high plateau country 250 feet above the Des Moines River, and the only places where they dip down into dangerous territory are where they cross the river on ancient steel-truss bridges erected years ago.

Some day soon they will have to do something about those bridges. Saum is borrowing trouble by worrying what would happen if a flood occurred at deck level, coupled with a lot of floating trash or ice. So far the floods at that height have been clean water, without the logs and ice.

Many of today's roads were built originally as graded earth. In the past 10 years, construction of higher-type roads has accelerated. Right-of-way has been increased in some cases to 88 and 100 feet, and indications are now that more wide right-of-way will be purchased, rather than to buy a narrow right-of-way and borrow dirt at a high price. A clear, wide location makes it possible to balance the earth quantities and get a high type of construction.

Many of the local roads have been built up rapidly. A scheme was followed for a long time whereby 700 cubic yards of crushed rock, ¾ inch minus, was hauled in to a road which had just been re-graded. This rock was then spread and rolled. A single gravel assessment was all the residents had to pay. The following year another 500 cubic yards went in, with another dressing and rolling. This gave about 3½ inches of rock surfacing, and it worked out satisfactorily in all but extremely dry weather.

Much of the hard-surfaced mileage today is based on the application of 1,500 cubic yards of stabilizing gravel per mile. The producing contractors furnish it hauled to the road, and Boone County's maintenance men and machines spread and roll it. Today these roads are some of the best on any county road system in the state, even if they do have certain faults.

Dry Weather Hard on Gravel

Dry summer weather is the worst enemy of these gravel highways. With intermittent rain and blading by a motor grader, it is possible to maintain these roads in excellent shape. But when a long, hot, dry spell appears, these roads have certain disadvantages.

The larger gravel particles gradually work loose, and the fine binder particles blow away as dust. The large gravel is then left free to roll around like ball bearings. Corrugations appear, the roads get rough, and if maintenance action isn't swift, the Iowa farmers get on their telephones.

There is only one way for maintenance to take care of a situation like that. A motor grader passes over the road and moves the loose material over to the edge. Later, when the next rain comes, the grader picks up a few fines from the shoulders and ditches, remixes them with the gravel, and lays the windrow back down.

County Tries Asphalt

The situation got so bad on some of the heavily traveled county roads that the county decided to try the application of an oil binder to hold the gravel together. Realizing that the 4-inch-thick bases were not too strong, they tried the oil on an experimental basis to see if it would work.

First of all, the maintenance machines came in and polished the gravel grade to perfection. The application of asphalt was let by contract. Saum tried approximately 0.3 gallon of SC-1 asphalt for a prime course, followed by 3 gallons of MC-5 and about 30 pounds of cover chips, rolled down. Altogether

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C. & E. M. Photos

Above, Boone County's main repair shop at Boone, Iowa. At right, shop mechanics overhaul an Adams motor grader out in the yard.

there are now some 25 miles of this construction.

In addition, 7½ miles of that total has now received a second asphalt treatment, this time with MC-5 and the same amount of chips. While the work is only a year old, early results look promising. The asphalt is holding the gravel down satisfactorily, and the gravel subgrade and base so far appear to be strong enough for the traffic.

The proper coordination of preliminary work by county forces and the application of asphalt by the contractors has been somewhat of a problem, but is likely to become easier as time goes on. On several of the jobs the men bladed and polished the gravel to perfection, only to find that the contractors were delayed several weeks in their arrival. Since it was impossible to continue maintenance work beyond that point without raising a lot of dust and causing actual damage, there were a few places where an exceptionally smooth surface was sacrificed in favor of sound construction.

Saum pointed out that the whole history of this type of construction has usually resulted in failure, but that many of the failures were the result of "zero maintenance". He plans to keep his asphalt surfaces maintained at all times, and in case they do not hold up, he says the county will not hesitate to scarify them and turn the road back to gravel. That, however, appears hardly a possibility at this time.

Approximately 10 per cent of the county system seems to qualify, by virtue of the traffic, for the higher type asphalt treatment. Whether the people will continue to be satisfied having 90 per cent of the system gravel roads is anybody's guess.

Saum summed up his philosophy by saying, "All we're selling is a good riding surface. With money hard to get, it's foolish to waste it on frills, fancy offices, or equipment we don't need."

Not that the county doesn't have plenty of good equipment. There are 12 motor graders, about 8 under-body blades mounted on Marmon-Herrington Fords, and plenty of trucks. Altogether there are about 24 trucks, about 8 of which are heavy enough to take V-type snow plows.

Reading recently of a county road set-up where the engineer had 18 assistants in his office, including several stockroom clerks and equipment-operating-cost clerks, Saum sighed wistfully. "That's what every county engineer would like to have," he said, "just like every kid would like to have a Cadillac convertible. But we'll get along without it."

At that, Saum has one distinction. His engineer's office is not in the basement or the attic of the courthouse. It is on the first floor, on a par with the County Sheriff and Treasurer. His offices have several rooms, including a large engineering-drafting space.

Snow Removal

Any time between December 1 and April 1, Boone County can expect snow. Favored by all-weather highways the rest of the year, the farmers have come to expect snow removal as a matter of course. Snow-removal methods and equipment are the latest. The snow-removal fleet is built up around a number of small push plows, mounted on the trucks which do other work in summer. There are also 8 large V-plows and a few wings, which are mounted on Oshkosh and FWD trucks. All the motor graders are subject to call, also, when the snow comes.

The county roads which have recently been built to wider, higher standards remain open, however, when the older

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County Emphasizes Road Construction

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roads drift shut. This is because their grades are generally up above the surrounding country, and the slopes flatter. With the exception of one or two days last winter during the worst storms, county roads were as open and easy to travel as the state highways.

All in all, the Boone County road system represents a traffic network which has taken years to build. Saum himself has watched it grow from 1913, when he got into the engineering game, although he has been in Boone County only since 1938. But the system today is adequate to handle the vital traffic of this community without embarrassment to anyone: the traveling public or the engineering department.

New Trench Digger

A new trench digger which can do a variety of jobs for contractors has recently been designed by the Ottawa Mfg. Co., 624 King St., Ottawa, Kansas. It weighs around 5,500 pounds and has digging depths ranging from a few inches to 8 feet, with a maximum cutting width of 19 inches.

The front-end delivery conveyor throws dirt to left or right and may be operated independently of the trench cutters or knives. A 4-cylinder air-cooled Wisconsin motor, with roller bearings and friction clutch, powers the unit. Owing to its lightweight construction and low overall height, the digger can be easily moved from shop to job, according to the manufacturer. Overall dimensions without the boom are 13 feet 1 inch long, 7 feet 2 inches wide, and 5 feet 9 inches high. It has six creeping speeds and three road speeds, plus reverse. Maximum road speed is approximately 16 mph. The gearings on the machine are immersed in a dust-proof tank of oil to reduce rust and wear to a minimum. The steel drag that digs the trench moves over the beam at the rate of 300 linear feet per minute. The 14-foot boom is equipped with power lift.

The trencher, which marks Ottawa's entrance into the field of lightweight dirt-moving equipment, has compensating power drive. The front axle has a rocker level device to prevent side strain. The channel-steel-frame chassis

Ottawa's new trench digger has a maximum cutting width of 19 inches and a depth of 8 feet. A front-end delivery conveyor throws dirt left or right.

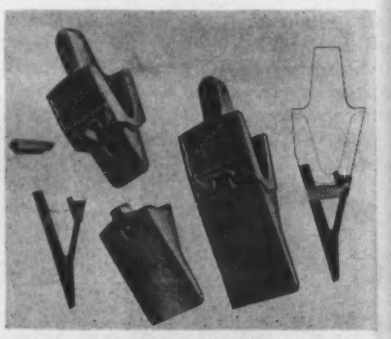
is electrically welded for strength and rigidity. Implement-type mud-grip tires, 7:50 x 20, are used on the back wheels. Virtually all of the working parts are standard.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 147.

Replaceable Teeth For Shovel Buckets

Replaceable shovel teeth which lock rigidly to their adapters for longer wear are a new product of Baer Steel Products, Inc., Auburn, Wash. Their patented triple-locking design distributes digging stresses over a large locking area, enabling teeth to remain tight and thereby reduce adapter wear.

The new Baer teeth are cast in a tough shock-resistant steel—Fibraloy. Its fibrous structure permits high strength and shock-resistant properties at higher hardnesses. The locking feature consists of two heavy tongues, one at the top and the other at the bottom of the point shoe, where they are received by mating slots at the base of the adapter horn. Tongues and slots, horn and shoe, are wedged solidly together by a tapered pin driven through the assembly and securely locked by bending its malleable tip into a special recess.



Replaceable shovel teeth which lock rigidly to their adapters for longer wear are a new product of Baer Steel Products, Inc.

Further information may be secured from the company. Or use the Request Card which is bound in at page 16. Circle No. 126.

Truck Line for 1950

From the GMC Truck & Coach Division of General Motors, Pontiac, Mich., comes word of the GMC truck line for 1950. GMC features stepped-up horsepower in its light and medium-duty engines, together with cab, engine, and chassis advancements. New model series have been introduced in the 1½ and 2½-ton ranges and two new six-wheeler series in the 24,000 to 32,000-pound range, gross vehicle weight. There are also two lighter diesel tractor series of 45,000 and 55,000 pounds combination weights, as well as lightweight options in the big 900 diesel series.

Greater horsepower in three light and medium-group engines has been achieved through redesigning the intake manifold, installation of new high-lift cams, a larger carburetor throat, and a change in valve timing and angle of the exhaust-valve seats.

The new 280 series, with an 11,000-pound GVW, is equipped with 4-speed Syncro-Mesh transmission and full-floating hypoid rear axle. The series is offered in wheelbases of 137 and 161 inches with 60 and 84-inch CA dimensions, respectively, and in chassis models or with platform, stake, or stake express bodies.

GMC has also introduced a new 470 series with a GVW rating of 20,000 pounds and a GCW rating of 37,000 pounds. This series, as well as the 450 group of 19,000-34,000 pounds, has the increased horsepower of the 270 engine. Conventional and cab-over-engine models, with 72-inch CA dimensions, are available for this series. Air brakes are optional. In both the 450 and the new 470 series, 5-speed constant-mesh direct-in-fifth transmissions are standard, with overdrive transmissions optional; and hypoid single-reduction rear axles are standard, with planetary two-speed optional. The 450 also offers a hypoid double-reduction two-speed axle as optional and the 470 an optional hypoid double-reduction axle. Both series are equipped with twin-cylinder high-torque hydraulic brakes. Larger lining areas and drums with more metál for better heat absorption are listed as further improvements in the brakes.

For 1950, GMC extends the advantages of dual-drive design to the middleweight range of models with the introduction of two new six-wheeler series, the HCW-400 and HCW-620. Combining tractive ability with extra-load capacity, these six-wheelers are designed for off-the-highway hauling, as well as for regular highway use where it is advantageous to have an extra axle for additional load.

The HCW-400 series has a GVW rating of 24,000 pounds and a GCW of 35,000 pounds. A 4-speed Syncro-Mesh transmission is standard with the 248 engine, and a 5-speed constant-mesh direct-in-fifth optional, as well as 5-speed overdrive and 3-speed auxiliary. With the optional 270 engine, 5-speed direct-in-fifth is standard; the overdrive and 3-speed auxiliary are options.

The GVW for the HCW-620 six-wheelers is 32,000 pounds and the GCW 50,000 pounds. Hydraulic brakes are standard and air brakes optional. The standard transmission is a 5-speed direct-in-fifth Syncro-Mesh, with overdrive and 3-speed as options. Double-acting front shock absorbers are standard on this series.

Both six-wheeler series have dual-drive rear axles in which the power is transmitted to both axles by a torque divider containing an inter-axle differential mounted on the forward unit. Alignment is maintained by torque rods and equalizing beams which transmit driving and braking forces to the chassis. Semi-elliptic springs are swivel-mounted on the equalizer beam cross-tube, shackled to the front at the frame bracket and sliding at the rear bracket.

Two new GMC diesel truck-tractor series bring the power of the 2-cycle 4-cylinder GM diesel engine into the lighter models of the heavy-duty range. Designated as the HDCR-640 and 650, these weight-saving diesel-powered tractors have GCW ratings of 45,000 and 55,000 pounds, respectively. They are offered in wheelbases of 141, 153, and 165 inches. In GMC's big 6-cylinder 900 series diesels, too, there are new, lighter units for 1950, made possible by many weight-saving equipment options. Savings range from approximately 1,200 pounds on conventional models to about 2,500 pounds on the 950 six-wheelers.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 124.

Here is one of GMC's heavy-duty rear-dump models during a construction operation.

Steel Castings Booklet

Twelve basic considerations which should govern the selection of a supplier of steel castings are reviewed in a 32-page brochure issued by Continental Foundry & Machine Co., 220 Grant St., Pittsburgh, Pa.

As a producer of steel castings for machinery; construction; dredging, hydro electric, and heavy mill equipment; gears; rolls; and other parts, Continental brings its knowledge and experience to the preparation of this booklet.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 20.

A P&H Zip-Lift hoist helped fill the material-handling bill on Gebhard-Berghammer's large church-building job.

Electric Hoists Aid Church Construction

The problem of supplying brick, stone, mortar, and steel to upper levels of a large church structure was simplified for contractor Gebhard-Berghammer, of Milwaukee, Wis., by two P&H Zip-Lift electric hoists. One 500-pound model was bolt-mounted to a portable support. Once a chain sling was attached to a wheelbarrow, a workman on the upper level simply pushed a button to raise the load. When it had been raised, the wheelbarrow was swung over the scaffolding by means of a lever. It took less than an hour to set up the hoist and its supporting rig on a vertical scaffolding support in a different location.

The other hoist, a 1,000-pounder with push-button control, operated on a 30-foot swinging jib which enabled it to serve any point in a 60-foot line. It was used to lift heavy stone for copings, window trim, etc., as well as structural steel.

Information on P&H hoists for service in all types of construction may be obtained from Harnischfeger Corp., Hoist Division, 4400 W. National Ave., Milwaukee 14, Wis. Or use the Request Card at page 16. Circle No. 3.

Automatic Sharpener Grinds Mowing Knife

An automatic mowing-machine-knife sharpener is now manufactured by Boyer Industries, 3415 Lakeside Ave., Cleveland 14, Ohio. The sickle bar is placed in the designated slot on the top rail of the machine, one end on the starting line marked on the rail. The carriage moves back and forth, and at the same time is translated in a lateral direction. This completes the sharpening of the sickle blades; the grinding wheel has passed over the blades twice, and the carriage has caused the wheel to grind each individual blade four times per machine cycle. An automatic stop switch controls the traveling carriage.

The dimensions of the sharpener are 1 foot 3 inches wide x 8 feet 4 inches long x 3 feet 10 inches high, and its weight is 350 pounds. The machine frame is of all-welded steel construction. The grinding wheel is a standard sickle cone wheel, 5½ inches in outside diameter, 3½ inches wide, with 20-degree crowned angles. The housing of the grinding wheel serves a double purpose. It functions as a safety guard, and it also carries away grinding dust and sparks through its extended downpipe. The spindle operates at approximately 1,400 rpm with V-belt drive, and has 9-inch-spaced bronze bearings. The sharpener will grind any length of sickle bar up to 7 feet at the rate of five 7-foot sickle bars per hour of machine time, according to the manufacturer.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 110.

Metallizing Equipment

A descriptive booklet on the Mogul gun and metallizing process is offered by the Metallizing Co. of America, 3520 W. Carroll Ave., Chicago 24, Ill. This 16-page catalog explains all features of the process and the equipment used. Suggested applications for metallizing include rebuilding worn parts, applying corrosion-resistant and special surfaces to parts, and correcting mis-machinings in production.

The bulletin points out that the metallic coating is applied by a so-called metallizing gun, which is a self-contained device consisting of two essential assemblies—the power unit which feeds the wire at a constant selected speed and the combustion unit which reduces the wire to a molten state under flame action. As fast as the wire is melted, a concentric air blast atomizes and projects the molten metal against the surface being coated. Inasmuch as this is a continuous operation, the metal spray coating may be built up to any desired thickness for a specific job.

The catalog fully explains the proper techniques for surface preparation, application of the coating, and surface finishing. The types of wire available and the cost of metallizing are also discussed. Job stories and illustrations round out the booklet.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 139.

Deputy Chief of Engineers

Brigadier General John S. Bragdon has been named Deputy Chief of Engineers, Department of the Army, to replace Major General Roscoe C. Crawford who retired on November 30. Brigadier General George J. Nold succeeds General Bragdon as Assistant to the Chief of Engineers and head of the Military Construction Division.

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62	63	64	65	66	67	68	69	70	71	72	73	
74	75	76	77	78	79	80	81	82	83	84	85	
86	87	88	89	90	91	92	93	94	95	96	97	
98	99	100	101	102	103	104	105	106	107	108	109	
110	111	112	113	114	115	116	117	118	119	120	121	
122	123	124	125	126	127	128	129	130	131	132	133	
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98	99	100	101	102	103	104	105	106	107	108	109	
110	111	112	113	114	115	116	117	118	119	120	121	
122	123	124	125	126	127	128	129	130	131	132	133	
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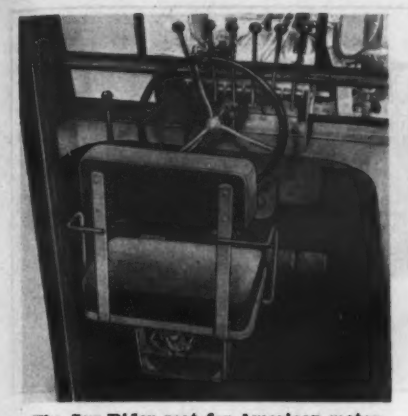


The Joy Rider seat for American motor graders is designed to lessen operator fatigue and step up efficiency.

Added Seat Comfort For Grader Operator

Now provided as standard equipment on all motor graders made by American Road Equipment Co., Omaha, Nebr., the new Joy Rider seat is designed to lessen operator fatigue and step up efficiency.

A hydraulic shock absorber combines with a soft cushion seat and back rest to cut down the shock of bumps and jolts over rough ground. A specially constructed sleeve permits a leveling-off action that keeps the operator level while the grader is at a slant. The seat is adjustable for height to enable the operator to see the working blade and to have visibility in all directions.

The Joy Rider seat is custom-built for American by the Fleischer-Schmid Corp., Columbus, Nebr., seat designer and manufacturer.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 73.

Coated Work Glove

A surface-coated work glove with a soft-cloth lining, designed for safety, economy, and comfort, is made by the Arcadia Mfg. Co., of Birmingham, Mich. A special process impregnates and seals the Seco cotton glove. This process, the company says, imparts stamina to the fabric so that it does not peal, will not support combustion, and resists acids, alkalies, oils, etc., for periods of time dependent upon the concentration. The glove retains its flexibility, even though the coating is both tough and leakproof, according to the manufacturer. Styles offered include the knit wrist, the gauntlet, and the band top. All models are available with open backs, if desired.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 50.

LeTourneau Ups Wacker

George Wacker is now Western Sales Manager, succeeding O. A. Williams, for R. G. LeTourneau, Inc. From headquarters in Peoria, Ill., he is supervising the company's sales representatives and assisting its distributors in Oregon, Washington, California, Idaho, Nevada, Arizona, Utah, Alaska, and British Columbia.

Data on Foundation Pipe

An 8-page fully illustrated bulletin on foundation pipe for use as end bearing piles, friction piles, compactor piles, batter piles, caissons, and underpinning is available from Armco Drainage & Metal Products, Inc., 703 Curtis St., Middletown, Ohio. Armco foundation pipe, the catalog explains, is a spirally wound and welded tube made on automatic machines from specially prepared coil or skelp-plate. The helical seam is continuously welded by the submerged-melt process as the tube emerges from the forming rolls.

A complete table of dimensions and properties of Armco foundation pipe is included along with a one-page summary of the special features of this pipe. The folder points out that ordering definite lengths to meet job requirements eliminates extra handling and field splicing. The pipe may be obtained with mill-attached plate ends, cone points, and cutting shoes.

Additional information is given on the Armco Hel-Cor pipe shell, a continuous-lock-seam corrugated pipe made by automatic machines. Where usable, it is designed to replace hand-riveted corrugated shell. The folder explains that the helical corrugations are nominally ½ inch deep and have a 2-inch pitch. There are no longitudinal or circumferential seams, and no rivets. The pipe strip is joined with a single permanent lock seam, which follows the spiral in the valley of the corrugations. Complete data are given on the shell for sizes from 12 to 18 inches.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 37.

New Sub-Base Is Laid On Badlands Highway

Road-Mixed Gravel Base Manufactured and Laid On 3.7-Mile Section of New Graded Realignment

✦ IT was always one of Teddy's failings, they say, that he searched the four corners of the earth for excitement. San Juan Hill, Manila, Central America . . . these were the places Teddy chose to swing a big stick. In a way, President Roosevelt missed a lot so far away from home.

For right close to his home ranch, near Medora, N. Dak., there lay dormant until 1949 one of the big adventures of that region. Had Teddy known, in 1899, about such things as scrapers, rippers, rock crushing plants and motor graders, he would certainly have deferred the charge of his Rough Riders long enough to get in on the North Dakota excitement.

A job has been finished on U. S. 10 east of Medora which would have made the man with the moustache exclaim, "Bully! Let's get after this one, boys!"

Working under a North Dakota State Highway Department contract, the Sidney, Mont., construction firm of Albert Lalonde Co. has finished rebuilding 3.715 miles of U. S. 10 through the heart of the North Dakota badlands. Costing $349,660, the project realigned the old highway to the most modern standards, eliminating a steep, winding highway which originally swung in a wide bend to the north and back into Medora.

Almost 815,000 cubic yards of grading were called for in the relatively short contract, and Lalonde had to fight as bitter a battle as Teddy fought at San Juan Hill, in order to get some of the construction cuts pioneered and started. There are many people who think of North Dakota as a flat state, but there were several cuts 100 feet deep on this project.

People who believe North Dakota is flat should have seen the tractor operator on a D8 who pioneered to the top of a high, sharply eroded badlands butte, only to hang up on center at the top! He took a lot of ribbing before they finally got him loose.

Soil so hard a single-tooth ripper would scarcely penetrate, tricky rock, and the construction of embankments to high density were some of the routine problems whipped by Lalonde's men. They finished their work by September 1, not too long after starting on May 13.

Surfacing by Subcontract

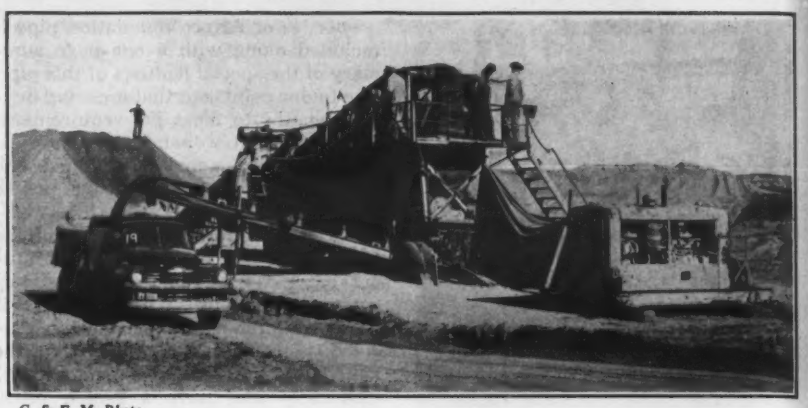
Production and installation of a gravel base, an asphaltic concrete pavement, and a seal coat with chips was subbed by Lalonde to Northwestern Engineering Co. of Rapid City and Denver. In a way, Northwestern's crews had as much of a problem on their hands as their predecessor, because the crushed-rock crews had to fight a battle with traffic instead of the elements. Motorists, eager to use the new highway which had been thrown open after the old one was closed off, thronged the project. U. S. 10 is the main transcontinental route carrying traffic toward Yellowstone National Park. Enough said.

Northwestern's subcontract called for the production and installation of 14,865 cubic yards of pit-run base, 10,350 tons of stabilized base, and 6,923 tons of combined aggregate for the asphaltic concrete mix. The pit-run base was laid in a full-width course 5 inches thick, topped by 2 inches of stabilized base. The 22-foot asphalt-concrete mat, 2½ inches thick, lay centered on the rock work.

The graded roadbed contained 11,500 feet of 42-foot finished width and 8,100 feet of 36-foot roadbed. The subgrade which Lalonde's equipment left behind was finished off to a crown rate of 0.024 foot/foot. The 42-foot highway has 8-foot shoulders, while the narrower roadway is provided with 5-foot parking areas.

In all cases, plans called for the installation of the pit-run and stabilized base the full width of the highway, which makes gravel shoulders and insures excellent surface drainage. The graded side slopes are as flat as 4 to 1, as snow-cleaning insurance.

The specifications also called for 30,496 gallons of SC-1 prime, to be applied at the rate of 0.35 gallon per square yard. The seal coat is RC-2 at 0.25 gallon per square yard, topped by chips.



C. & E. M. Photo
"Old Ironsides", a 13-year-old Cedarapids crusher, turned out about 150 tons an hour on Northwestern's subcontract. A Caterpillar D 13000 was the main source of power.

"Old Ironsides" Moves In

C. R. Denton, Northwestern's weatherbeaten old Irishman who has an acquaintance with gravel pits like Carter has with pills, started things rolling by arriving in Medora one hot August morning with "Old Ironsides" in tow.

"Old Ironsides" is Denton's affectionate name for the venerable 13-year-old

(Continued on next page)

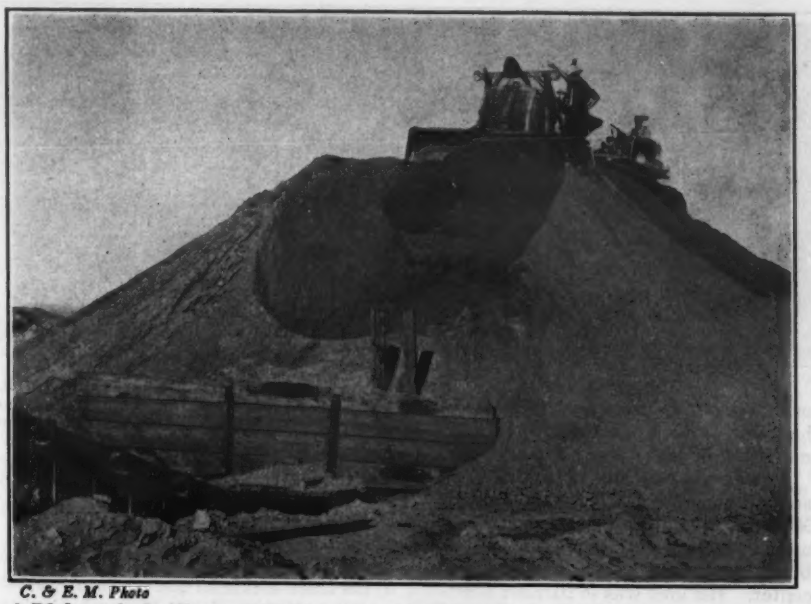
rock plant, which he swears by, and sometimes at. "But she'll still do a hundred an' fifty yards an hour in this kind of stuff, and she *has* hit as high as 400," Denton contends, with his chin out-thrust as if he were used to rock crusher salesmen disagreeing with his views.

The gravel pit, which furnished all of the rock base and aggregate material, was located about a mile off the highway on a high butte above Medora. The badlands are such a tricky source for aggregate that this one had to be designated despite the fact that about 6 feet of clay and silty overburden lay over the deposit.

"I put my two D8's to work shoving the stuff off to one side, though," Denton explained. "Even used a No. 12 motor grader over there. If I'd had anything more, that would have been out there too."

The stripped material went off to one side, where it was not in the way of equipment.

Pit-run base specifications were not too rigid, calling only for the maximum size not more than half the thickness of the course. The specifications were also clear that this material had to be granular.



C. & E. M. Photo

A D8 dozer feeds pit-run material to the crusher trap on the North Dakota badlands job.

In spite of this, however, all pit-run material was sent through the crusher. Pit material was moved to a timber trap by two D8-mounted Caterpillar bulldozers, where it dropped down to a mechanical reciprocating feeder. This feeder then sent the material out to a 30-inch conveyor 50 feet long, which transported it to the top of the plant.

The material dropped to the upper deck of a set of Cedarapids 4 x 12-foot vibrating screens. Oversize from the top deck dropped into a 9 x 36 jaw, and was then by-passed back to the top screen deck. Material retained on the second deck passed through 24-inch rolls, and joined the throughs from the bottom screen deck. Everything then passed out of the plant over a 50-foot stacker belt, which placed it directly into a fleet of 10 Chevrolet trucks, which hauled it away to the fill at the rate of about 6 cubic yards per load. A third screen deck was used for production of combined aggregate and chips.

The main source of power for "Old Ironsides" was a Caterpillar D13000 engine, which delivered through a flat belt drive. On pit-run material, where there was little crushing required, the plant produced about 150 tons an hour.

Specifications for the stabilized base-course material, which forms a 2-inch layer over the pit-run material, were somewhat more rigid, as follows:

Size Screen Square Opening	Per-Cent Passing By Weight
1-inch	100
¾-inch	80–100
No. 4	50–100
No. 10	35–90

Of the gradation passing the No. 10 mesh in the above material, from 40 to 70 per cent passing were the permissible limits over the No. 40 screen, with 5 to 25 per cent through the 200-mesh sieve. The liquid limit of the fraction passing the No. 40 sieve was set at 35 per cent, with a plasticity index of 3 to 9. The specifications also provided that the fraction passing the No. 10 mesh should not be less than 60 per cent of the material passing the No. 4 sieve.

Specifications for the combined aggregate in the hot-mix were most rigid. They were as follows:

Size Screen Square Opening	Per Cent Passing By Weight
¾-inch	100
No. 4	50–83
No. 10	25–60
No. 28	15–42
No. 48	10–28
No. 100	5–17
No. 200	2–8

Laying the Material

The granular material was placed on the edge of the roadbed by the dump trucks which hauled out to the job. From that point on, the battle with traffic began. The only way to win was to go along with traffic, by setting the pace with motor graders.

As a rule, all material which was dumped in a day was processed and spread the next. This made a section about 1,500 to 1,600 feet long, with one ½-mile section the longest which was handled.

The material was first blade mixed by an Adams 512 and a Caterpillar No. 12 grader. They left the material out in the center of the highway when they had finished, ready to mix out with water and lay. As the graders made their trips through, traffic followed close behind them. The work was done without flagmen.

With the windrow in the center of the highway, the machines then began to cut material out to the edge of the roadbed. As the gravel went out in flat layers, a 2,000-gallon truck-mounted water tank applied water from the Little Missouri River near Medora. The material was then picked up again,

(*Continued on next page*)

C. & E. M. Photos

A sprinkling tank (left) moves down U. S. 10 in North Dakota during Northwestern's gravel-base road-mixing job. Next, the Adams 512 motor grader in the foreground and a Caterpillar No. 12 in the rear cut base material out of the windrow and mix it with water. A Bros Wobble Wheel roller, above, pulled by an International 1W9, compacts the base.

New Sub-Base Is Laid On Badlands Highway

(Continued from preceding page)

road-mixed thoroughly by two complete trips by both machines, and laid out in its permanent location. An International rubber-tired tractor with a Bros pneumatic Wobble Wheel roller, heavily ballasted with sand, did the compaction. It worked continuously as the gravel was spread.

After the first thickness had been laid and processed, the motor graders went back to pull more material out of the center windrow. The whole process was then repeated until the entire 5-inch thickness had been waterbound, road-mixed and laid down in place.

The stabilized base material was laid down in the same way, after being mixed with about 15 per cent of clay material as a binder.

By keeping the construction sections short, and working only during a 10-hour shift in daylight, traffic was handled safely with as little inconvenience as possible to the passing motorists. Finished grade was carefully watered each day, as required, and maintained in smooth shape by the blades. It has become a widely known trademark throughout the west wherever Northwestern Engineering Co. does this kind of work that you can tell one of Morris Adelstein's projects by the finished smoothness maintained during construction. Adelstein is the President of Northwestern Engineering Co.

Plant-mix asphaltic concrete was mixed by a Barber-Greene continuous-mix asphalt plant, with 120-150-penetration asphaltic cement shipped in from Wyoming's Big Horn Basin refineries. The pavement was laid by a Barber-Greene Tamping-Leveling Finisher.

Personnel

The new project was designed and directed by M. P. Wynkoop, Chief Engineer of the North Dakota State Highway Department, with F. H. Brasie as Construction Engineer and Ben E. Moordale as Resident Engineer. C. R. Denton supervised Northwestern Engineering Co. operations, and Roy Olson was General Superintendent for Lalonde.

A Wealth of History

Completion of this new highway marks another step in the progress of the badlands region of this country which was rich in historical lore long before modern highways came. Theodore Roosevelt's ranch was near Medora, and oldtimers say that Teddy was happiest, in his declining years, reminiscing of the old days on the ranch.

It was perhaps as a result of his acquaintance with Roosevelt that the Marquis de Mores, a titled French nobleman, came to Medora in 1883 and built a then modern meat packing center. His idea was to furnish dressed beef to eastern markets direct from the western range, since this part of North Dakota was not far from the upper end of the Texas Trail. De Mores hoped to live a life of service and luxury, resting in his huge estate in the peaceful western country near by.

His venture was a success, but a bad fire destroyed the packing plant in 1907. The old brick chimney still stands, and a memorial plaque erected by the North Dakota Highway Department bears

(Concluded on next page, Col. 2)

The Tire-Master makes a fast job of breaking the bead on any size tire. With adapters, it attaches to spoke, cast, semi-disk, or solid disk-type wheels.

Tire-Removing Tool

A new Tire-Master tractor-tire tool, designed for use on all types of wheels, is offered by the Bee Line Co., of Davenport, Iowa. It is made of high-grade steel welded into a solid, strong unit. The directly attached chain is used for securing the tool on spoke-type wheels.

Three attachments are supplied for use on other types of wheels. The flat anchor attachment is used on disk-type wheels, the ring-bolt attachment replaces the rim-stud on Ford-type wheels, and the hook attachment fastens securely to the rims of off-the-wheel types. The long handle of the tool is designed to give leverage needed to break the bead on tough tires.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 102.

Angle-Head Wrenches

A series of angle-head wrenches for close-quarter work has been added to the line made by Snap-on Tools Corp., Kenosha, Wis. Forged from a high-carbon steel, they are specially heat-treated and tempered to give them the toughness to stand up under all kinds of working conditions.

The heads of these wrenches are set at different angles—one 30 degrees and one 60 degrees—to the handle. As both heads on each wrench are the same size, switching ends permits turning nuts in narrow swing areas. The thin heads—only ¼ inch on the largest size—mean reduced clearance problems.

Other features include well rounded handle edges, pear-shaped heads which simplify use in close-quarters while giving extra wall strength at the point of greatest strain, draw-broaching which results in clean-cut close-fitting wrench openings, and a rust-proof double-plated finish of nickel and chrome. Four wrench sizes are available with 7/16, 1/2, 9/16, and 5/8-inch openings.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 13.

Bronze-Valve Line

A new line of Hancock bronze valves, designed for all pressures up to 150-psi saturated steam, with 500 Brinell stainless-steel seats and disks, has been announced by Manning, Maxwell & Moore, Inc., Watertown 72, Mass. The valves are manufactured in sizes of ¼ inch through 2 inches, and are available in globe and angle types, screwed ends.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 116.

Wall-Form Construction Described in New Catalog

A new 34-page catalog on its system of wall-form construction has just been issued by the Symons Clamp & Mfg. Co., 4249 Diversey Ave., Chicago 39, Ill. Illustrations show in detail how the forming system operates. Actual jobs where Symons forms have been used are depicted—showing the form in use as well as completed foundations. Blueprint illustrations and complete specifications are given, with data on the material and equipment necessary, time required, and cost figures on actual jobs.

By sending plans and specifications direct to Symons, you will be furnished a free form layout of your job without charge or obligation. For a copy of the new catalog, use the Request Card at page 16. Circle No. 94.

New Sub-Base Is Laid On Badlands Highway

(*Continued from preceding page*)

eloquent testimony to this chapter of Medora's life. A framed picture of Teddy Roosevelt still hangs in the lobby of the Rough Rider Hotel in the town.

In a way it was a shame that Teddy could not have been around to see the recent battle through the badlands, because it was just the kind of struggle he would have liked.

Large Paper Mill Is Built in South

Multi-Building Alabama Newsprint Plant Completed In Less Than Two Years At Cost of $32,000,000

By WILLIAM H. QUIRK,
Eastern Editor

(*Photo on page* 1)

✦ A NEW paper mill for the manufacture of newsprint and other pulpwood products has been constructed in Alabama for the Coosa River Newsprint Co. at a cost of approximately $32,000,000. The J. E. Sirrine Co., Engineers, of Greenville, S. C., engineered the construction of the multi-building plant which was built by the Daniel Construction Co. of Birmingham, Ala., and F. H. McGraw & Co. of Hartford, Conn.

The Daniel company handled the construction of the buildings, while the McGraw firm did the mechanical work including piping, electrical installation, ventilating system, boilers, and installation of machinery. Construction on the big project got under way in June, 1948, and the plant was ready for operation in January, 1950, less than 2 years after the ground breaking.

The plant is located on a 615-acre site in Talladega County, Ala., on the east bank of the Coosa River, and adjacent to the Government-owned Alabama Ordnance Works plant. It is 40 miles southeast of Birmingham, and 5 miles from the nearest town, Childersburg. During the last war the ordnance plant manufactured smokeless powder and explosives. Such work is no longer carried on, but the newsprint company negotiated with the Government for the use of some of the plant's facilities including electric power, steam, and water. State Route 91 is within a couple of miles of the site, which also has rail connections with the Southern, Atlantic Coast Line, and Central of Georgia railroads. The bulk of materials was delivered by rail.

The area occupied by the plant is approximately 3,000 feet long in a north-south direction x 900 feet wide east to west. Four railroad tracks enter the layout from the north end and three from the south, fanning out to serve all parts of the area. The principal buildings of the plant include: receiving office and wood room; chip bin storage; recovery building; causticizing area; the main mill itself, 1,116 x 230 feet, housing the digester room, washer room, bleach plant, screen room, ground-wood mill, stock preparation room, machine room, pulp drier room, and roll storage; and a one-story red brick office building at the south end.

Pile Foundation

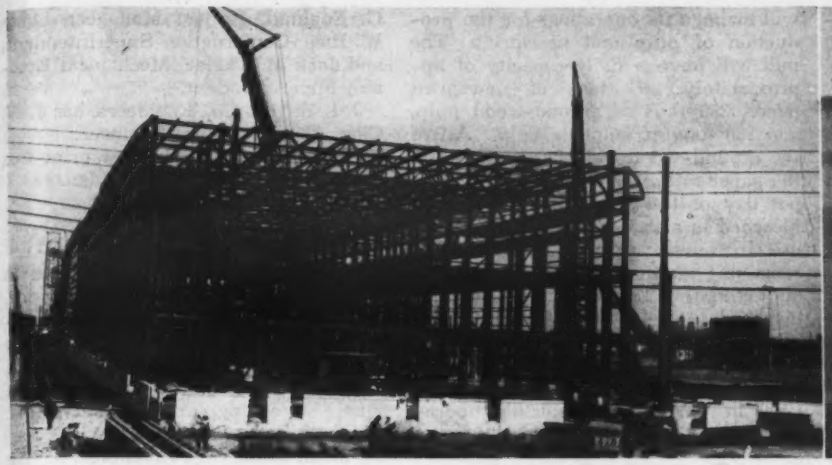
Built on a flat site of typical sand-clay soil common to this part of Alabama, the mill buildings required little excavation for their foundations. The heavy structures are supported on a system of 6,775 piles which are located not only under the columns, but also under all machinery area of appreciable weight. The Raymond Concrete Pile Co. of New York City and Atlanta drove the piles, starting in June, 1948, and finishing that December. Standard step-taper metal piles were used, with a 9-inch-diameter toe and 13 inches across at the top. The pile shells came in 8-foot lengths, and their depths ranged from 11 to 64 feet, with the average around 38 feet. As they were driven, the mandrel was removed and the shells were filled with concrete.

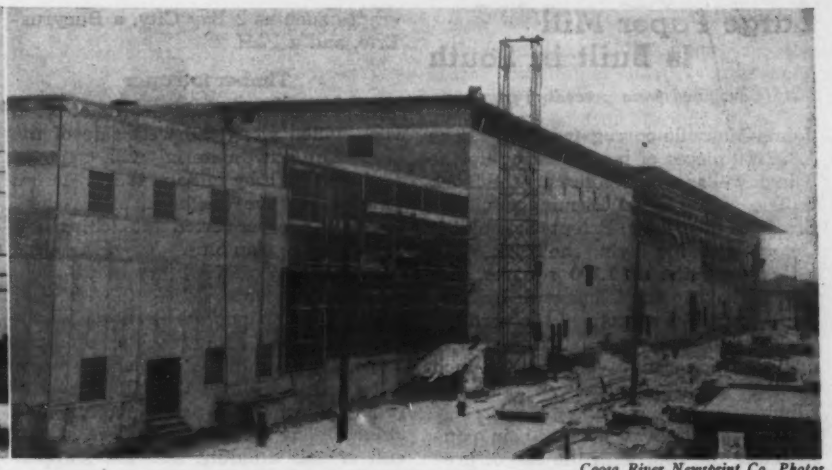
Three steam rigs drove the piles which were capped with concrete footings. Cranes with clamshell buckets excavated for the footings which, in some areas, were up to 12 feet square and 8 to 10 feet deep. A concrete batch plant was set up at the northeast corner of the site; it consisted of two Blaw-Knox bins—one storing 85 tons of aggregate, and the other holding 150 barrels of bulk cement. Sand and slag for the fine and coarse aggregates were supplied by the Birmingham Slag Co. Four different cements were used on the job; Alpha, Coosa, Lehigh, and Universal. Several Birmingham concerns furnished the reinforcing steel. Water was available at the site.

Concrete was mixed and delivered to the forms by a fleet of five Blaw-Knox 2-yard truck-mixers, and vibrated by Mall vibrators as it was placed. Around 40,000 cubic yards of concrete, reinforced with 2,000 tons of steel rods and bars, went into the plant. Concrete was used for all the foundation work and floor slabs; one building for chip storage is of reinforced-concrete construction throughout.

(*Continued on next page*)

Coosa River Newsprint Co. Photo
Raymond Concrete Pile Co. drove 6,775 step-taper piles to support the new paper-mill buildings at Coosa River, Ala.





Coosa River Newsprint Co. Photos

At left, structural steel goes up for the last bay of the mill machine room. Virginia Bridge Co. supplied the steel and handled the erection. Above, bricklaying is in progress on the west wall of the plant.

Wooden Forms

For this concrete work, Kimpreg surfaced plywood was used in the form construction, and each panel served over and over again for eight to ten separate pours. While all but the one building of reinforced concrete were built with structural-steel frameworks, the floor slabs in the steel structures are concrete. The Kimpreg plywood panels for the slabs were hung from the steel, thus eliminating the need for vertical shoring. Vertical 2 x 6's were stood along the bottom flanges of the steel floor beams to support horizontal 2 x 6's stretched between the I-beams. Wire looped over the beams held the joists in position, and the plywood panels were then placed on top. Joists were set on from 14 to 18-inch centers.

Structural steel totaling 6,650 tons for the plant was supplied and erected by the Virginia Bridge Co. out of Birmingham, Ala. Four crawler cranes set all the steel, working from outside the buildings. All the structures are riveted.

In laying the ground-floor slabs, the truck-mixers discharged the concrete into 8 Bell Prime-Movers, motorized buggies that carried the material to the forms. For the upper floors, the concrete was dumped into buckets that were raised to the desired level by two Jaeger hoists and emptied into floor hoppers. From there the concrete was distributed by the Bell machines.

Floor slabs are 6 inches thick, and were topped the same day they were poured with a 1-inch course of pea-gravel grout which was given a steel-trowel hand finish. The various grouts and mortars used on the job were mixed in either Jaeger 1-bag concrete mixers or Knickerbocker mortar-mixing machines.

Bleach Towers

One of the unusual features of the project was the construction of six reinforced-concrete tanks in the bleaching mill by the Rust Engineering Co. of Pittsburgh, Pa. The towers are 68 feet high, with 12 to 15-foot outside diameters and 10-inch walls. They were built with slip forms composed of 1-inch sheathing, 5 feet high, completely encircling the pour. Concreting was a continuous operation with the forms being raised or slipped only ½ inch at a time by means of 8 jacks. A rich mix was used, 6 bags of cement to a yard of concrete, and vibration was held to a minimum. A complete pour was a matter of days not of hours.

With this procedure the tanks were built without construction joints. All possibilities of leakage or corrosion were also eliminated.

Many other tanks were also built for the paper-making process in the bleach plant, washer room, screen room, stock preparation room, and machine room. Some of these are of concrete lined with tile, or else solid tile. The six tall towers are tile-lined. For handling stock, 35 chests were constructed of solid tile. The chests are 40 feet long x 20 feet wide x 14 feet deep; their 10-inch tile walls are strengthened with 1¼-inch reinforcing rods and filled with concrete.

Tile, a big item on the job with 275,000 pieces of structural and 54,000 pieces of glazed, was supplied by the National Fireproofing Co. of Birmingham, Ala.

Walls and Roof

The steel frameworks of the buildings are closed in either with brick or

(*Concluded on next page*)

Large Paper Mill Is Built in South

(*Continued from preceding page*)

Johns-Manville corrugated siding. The 1,250,000 pieces of brick making up the 8-inch walls were supplied by the Brick & Tile Mfg. Co. of Birmingham, Ala. Scaffolds made by Patent Scaffolding Co. were used in laying the brick. The siding consisted of 1,200 squares, and was secured to the framework by Nelson studs. The structural tile used for backing-up and for partitions is 4 inches thick and came in 8-inch squares. Tile cutting was done by Clipper masonry saws.

Great speed was achieved in constructing the roof with the use of precast-concrete channel slabs 1 inch thick and 26 inches wide. The channel-shaped sections in lengths of 6, 8, and 10 feet were supplied by the Alabama Cement Tile Co. of Birmingham, Ala. The slabs were topped off with a 20-year bonded roofing material.

The main building is 65 feet high. The tallest building is the recovery building with eight floors going up to 95 feet, and surmounted by a brick smokestack 225 feet high.

Contractors' Buildings

For this complicated type of industrial construction, the contractors set up a variety of their own shop buildings. Largest of these were three 40 x 110-foot Quonset huts, with concrete floors, that served as warehouses. One was a general warehouse, while the other two were for electrical and piping material and equipment.

The pipe shop was equipped with six Oster pipe-threading machines, and 9 G-E electric welders. Several other shops were located along the west side of the site, along with a fabricating yard for reinforcing steel. A carpenter shop for form work was outfitted with a Superior table saw, a Rockwell band saw, and a DeWalt utility saw. Shops were provided for sheet-metal work and the fabrication of miscellaneous iron; there were also electrical and machine shops. As soon as the main building began to go up, the machine shop was shifted inside to its permanent quarters.

For the maintenance and repair of heavy construction equipment, a well equipped garage was built. Cranes were the principal machines in use on the job. They included a diesel-electric American Locomotive crane of 35-ton capacity with a 55-foot boom; 2 Manitowoc Speedcranes with 90-foot booms and 15-foot jibs; 2 Lorain Moto-Cranes; an Insley truck crane; an Orton truck crane; and various crawler cranes such as 2 Bay City, a Bucyrus-Erie, and a P&H.

Timber to Paper

Room for about 20,000 cords of wood is provided along the west side of the site. The raw material will come to the plant both by rail and truck. Drum barkers remove the bark, after which the logs are converted into chips and stored in the chip bins. From there the chips go to the digester, washer, bleach, and screen rooms. While the material is still logs or chips, it is moved along on conveyors. After reaching the pulp stage, the material is carried in pipes.

The paper is made in the machine room on two large paper-making machines. The big rolls are stored at one end of this building, and are shipped out from platforms leading to the train sheds. The newspapers that will buy the newsprint are mostly in the south.

Pulp and Newsprint

The Kimberly-Clark Corp. is supervising the construction of the plant, and will manage its operations for the production of pulp and newsprint. The mill will have a daily capacity of approximately 300 tons of newsprint paper, 250 tons of ground-wood pulp, and 200 tons of sulphate pulp. All of the ground-wood pulp will be used in the paper mill. Approximately 70 tons per day of the sulphate pulp will be bleached in a three-stage bleachery for use in newsprint manufacture. The remaining sulphate-pulp production of approximately 130 tons per day will be bleached in a six-stage bleachery for sale to Kimberly-Clark Corp. under a long-term contract. About 750 persons will be employed at the plant, and about 1,500 in part-time woodlands operations.

Construction Personnel

During the peak of construction, about 2,045 workers were employed by the contractors on the paper mill. The Daniel Construction Co. and F. H. McGraw & Co.—the general contractors—were represented at the project by Carl G. Englund, Project Manager; James W. Rice, Construction Superintendent; and Jack M. Curlee, Mechanical Erection Superintendent.

J. E. Sirrine Co., Engineers, has J. W. Cantrell for Resident Engineer.

For the Coosa River Newsprint Co., W. E. Hornbeck is Resident Manager.

Malleable Washers

Malleable iron washers for use in pier and dock work, timber bridging, and shoring and falsework, are produced in three basic designs by the Malleable Iron Fittings Co., Branford, Conn. The designs are a curved back of square or rectangular shape, flat-round, and flat-square. All are designed to use the metal to the best advantage, having a heavy boss surrounding the bolt hole and ribs extending to the outer edges. They are available in 26 sizes for bolt diameters from ½ to 1½ inches.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 4.

New Compressor Line

A new line of heavy-duty compressors known as Air Chief Airistocrats is announced by the Davey Compressor Co., Kent, Ohio. These compressors are manufactured on special order for users who require features not available in a standard machine, Davey says. Production of the custom-built units will include 105, 160, 210, and 315-cfm models.

Airistocrat features include an extra-heavy welded steel frame, electric starting, fenders, locking gas cap, hand parking brakes, and electric service brakes. The latter can be connected to the braking system of any vehicle used to tow the compressor, according to the company.

Two hose reels, each of 150-foot capacity, are provided. Tires are 7:00 x 16, mounted on heavy-duty truck wheels. Three lifting hooks, one front and two rear, facilitate attachment of slings for transporting by crane. Large hood-protected locking toolboxes are located on each side of the trailer. These are 80 inches long, 16 inches wide, and 22 inches deep. An additional tool compartment at the rear carries steels up to 10 feet in length, suspending them beneath the compressor on specially designed brackets integral with the frame. At the rear of the unit is a steel platform which can serve as a workbench with vise and tools, or provide a foundation for an air hoist or winch.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 7.

Arc Welder, 200-Amp

The latest addition to the line of arc-welding machines manufactured by Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y., is the 200-amp Hornet Special. This machine combines the compact 36A generator with a 4-cylinder 31-hp air-cooled Wisconsin engine.

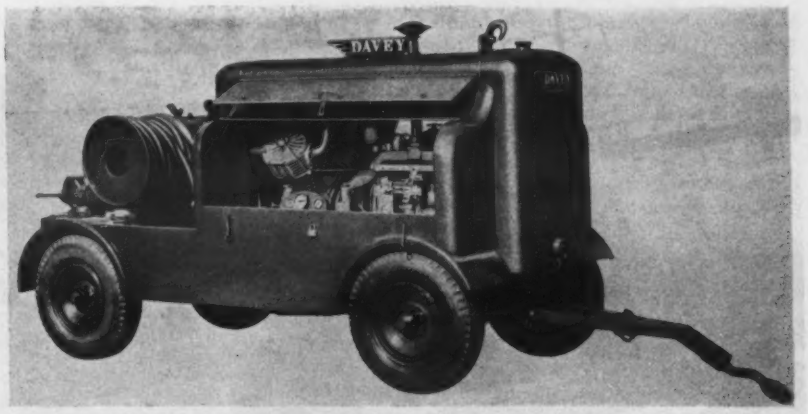
The 36A generator, which has a welding range from 40 amperes at 20 volts to 250 amperes at 40 volts, has a number of features. It is built as a two-bearing unit with closely spaced precision bearings to provide maximum load safety. Double shields keep bearings dirt-free and hold grease in. The panel-mounted control wheel indicates current markings—readily obtained by setting the pointer located in the center of the wheel. This hand wheel has five positions, with overlap to provide fine settings from minimum to maximum output of the machine. The 36A is a self-excited generator with excitation of the main field supplied by an auxiliary brush to provide rapid recovery voltage over a short circuit. Welding terminals are readily accessible, with ample space between them to prevent accidental shorting of welding cable lugs.

The Hornet Special is 58¼ inches long, 25⅝ inches wide, 47 inches high; it weighs 825 pounds. It comes equipped with a full-length drip-proof canopy. A lifting eye is provided on top. Two-wheel trailer-type running gear, with 4-ply pneumatic tires and a drawbar 38 inches long, is available as optional equipment.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 6.

Sales Building for Hyster

Hyster Co., of Portland, Oreg., has a new truck retail sales and service building at 4445 Third St., San Francisco 24, Calif. This new store, covering 10,000 square feet, is equipped to service all makes of industrial trucks and to handle a complete line of Hyster equipment. It will be a distribution center for 43 counties in northern California and 11 counties in western Nevada. R. L. Golden is Manager.



The Model 105 Airistocrat delivers 105 cfm at 100-pound pressure. It is 124 inches long, 66 inches wide, and 69 inches high.

Bulletin on Maintainer

Bulletin No. M-138 describing the Huber maintainer has recently been prepared by The Huber Mfg. Co., 202 N. Greenwood St., Marion, Ohio. The 16-page 2-color folder tells how the maintainer's several front-end attachments are used for a variety of applications. The 42½-hp 6,000-pound Huber, the catalog explains, can be operated as a grader, berm leveler, road planer, bulldozer, lift-loader, snow plow, highway mower, one-way broom, and patch roller. Complete specifications, features, and illustrations are given for the grader and all attachments.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 92.

Pre-Assembled Bridge Is Rolled Into Place

A 167-Foot Prefabricated Bridge, World's Largest, Provides 4-Track Overpass Where Pennsylvania RR Intersects Route 4 at Iselin, N. J.

By MICHAEL A. SPRONCK
Assistant Editor

✦ THE New Jersey State Highway Department has chalked up an interesting engineering achievement in its two-stage placement of a 167-foot prefabricated railroad overpass at Iselin, N. J. The new bridge, which involved underpass burrowing while express and freight trains roared overhead, will be a safety factor on New Jersey's most modern artery, the Route 4 parkway.

Project design provided for fabricating the bridge in two 28-foot halves, one to go on each side of the existing tracks, and each to support two of the Pennsylvania tracks. After placing, the halves were to be linked together as a single unit to span the 167-foot length and 100-foot width. The existing tracks were to be shored by a temporary trestle and removed just prior to the placing of the new spans.

The eastbound tracks were closed and replaced on November 20, the westbound two weeks later on December 4; both jobs were done on a Sunday because train traffic is 30 per cent lighter at that time. In spite of continually hot rails, the two sections were rolled into place and the operations successfully completed without mishap.

Shoring and Excavation

The four existing tracks, set on a normal road embankment, were shored by a temporary trestle of twenty-four lines of 33-inch and 16-inch I-beams placed on a forest of 12 x 12-inch timbers 14 to 25 feet high. Some 800,000 feet of timber was used for the job.

Tunneling under the tracks began a year prior to the moving. Earth was scooped out almost in handfuls while supporting steel and timbers were thrust underneath the line rails. Trains continued to race overhead at the rate of about one every three minutes.

Shoring was set to a fraction of an

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C. & E. M. Photos

Prior to placement of the new railroad overpass at Iselin, N.J., a locomotive crane rips out timber shoring (photo above). At right, the second half of the 167-foot prefabricated overpass is rolled into place while crack trains of the Pennsylvania RR roar over previously placed sections.

C. & E. M. Photo
Twenty-eight 100-ton jacks were used to place the 1,480-ton overpass structure. Here Superintendent Robert D. McGilvra directs lowering operations.

inch and two permanent abutments and one pier were footed down to hardpan and poured to permanent height for final bridge placement. All underpinning was inspected at frequent intervals and wedges were examined closely to insure holding to proper positions.

Spans Weigh 1,480 Tons

The bridge halves, one on each side of the right-of-way, complete with ballast, ties, and rails, were built on timber blocks resting on 2½-inch-diameter steel rollers, 36 inches long. The timber blocks were set to give a 4-inch clearance between the bridge and the piers.

The second half of the bridge was supported by cantilevering 10 x 16-inch timbers until it was moved into place over the angle supports of the previously placed span. Steel frames provided 33-foot tracks between the span's temporary cradle and its permanent site. Each span weighed 1,480 tons.

Towed Into Place

Starting early Sunday morning, some 100 men of Braun & Stuart Co., of Philadelphia, general contractor for the job, and 40 men of the Pennsylvania Railroad started their assigned tasks. High-tension electric wires were moved clear of the outside track to permit two 60-ton locomotive cranes to rip out the temporary trestle. The two cranes, facing one another, first removed the inside track and supports and then the outside, backing off as the job progressed. The clean-up preliminaries took about 7½ hours.

A little after noon, Bob McGilvra, Superintendent for Brann & Stuart, gave the signal for the start of rolling operations. Clutches were thrown on the four stationary winches and as the anchored lines tightened to a 33-ton pull, the structure slowly rolled into place. Twenty-eight 100-ton jacks were used to raise the structure, while supporting timber blocks were pulled, and then to lower it slowly into a perfect-fit placing.

A short time later railroad gandy dancers were bolting the last fishplates between the old and new rails and tamping ballast back of the end abutments and up to the bridge end plates. Eleven hours after start of operations the first train rolled over the newly completed railroad-overpass job.

Personnel

Other supervisory personnel on the job, in addition to Mr. McGilvra, included P. W. Tripplet, Division Superintendent of the Pennsylvania Railroad, and Spencer Miller, Jr., Commissioner of the New Jersey State Highway Department.

Concrete-Paver Catalog

A discussion of the relative production capacities of single-drum and two-compartment-drum pavers is featured in a new catalog released by the Koehring Co., 3026 W. Concordia Ave., Milwaukee 10, Wis. More than 45 photographs and drawings illustrate the high-capacity production features developed in the 34-E Twinbatch paver. Discussed in detail are Koehring's exclusive-design crawler shoes and three-point unit suspension mounting, the flow-line skip for fast drum charging, and the syphon-type water measuring system designed to provide uniform concrete.

Operating statistics indicate that the 34-E can hit a top output of 86.7 batches of concrete per hour on a 60-second mixing specification. The new bulletin shows how this production rate is achieved.

Additional diagrams illustrate the oscillating boom that keeps the discharge bucket in a constant vertical position, and the positive opening and closing of the transfer and discharge chutes mounted in the steel-plated two-compartment mixing drum. Mechanical features are outlined, and photographs show Twinbatch pavers operating on unusual projects.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 132.

Diesel Starter Fluid

Even during the winter a large percentage of diesel-powered equipment is kept out of doors. Engines for this equipment must be started where they are. However, keeping equipment running at idling speed to maintain engine temperatures and provide ready availability causes excessive engine deposits, sludge, and sticking fuel injectors, with resultant increased maintenance costs and shortened engine life. To combat this weather problem a new diesel starter fluid has been placed on the market by the Sinclair Refining Co., 630 Fifth Ave., New York, N. Y. This fluid, offered in two sizes of gelatin capsules and in cone-top cans with replaceable sealing caps, is designed to eliminate the use of heaters and electric boosters for starting in cold weather.

Where the mechanism for priming diesels is mounted on the dashboard, the capsule form is most desirable, as it enables the operator to start without the help of a second person injecting priming fuel into the engine. This effects a saving in labor as well as operating expense.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 118.

New Division for Dewatex

The Dewatex Mfg. Corp., of New York City, has formed an Asphalt-Seal Division to take over sales and distribution of its newly developed product Asphalt-Seal.

This rubber-soled Koehring paver can move over finished concrete without a trace of damage to the surface. Metalweld, Inc., does the rubber-lining work, using the B. F. Goodrich Vulcalock bonding process.

Paver Travels Road On New Rubber Pads

An exclusive process has been announced for vulcanizing resilient rubber to steel plates which, when bolted to crawler pads, permit pavers to move over finished concrete without damaging the surface. The process was developed by Metalweld, Inc., 26th and Hunting Park Ave., Philadelphia 29, Pa.

Metalweld uses the B. F. Goodrich Vulcalock bonding process in all rubber-lining work. The firm points out that the rubber and steel are joined with a bond strength of over 500 psi; and the use of these rubber pads on pavers eliminates the expense and labor of continually re-laying belting.

Further information may be secured from the company. Or use the Request Card which is bound in at page 16. Circle No. 43.

Ratchet Pulling Jack Has 20-Ton Capacity

A new steamboat-ratchet pulling jack of 20-ton capacity, for use in the construction industry, is manufactured by Templeton, Kenly & Co., 1020 S. Central Ave., Chicago 44, Ill.

The new model is built with a 2-inch screw and is available in barrel lengths of 24, 30, or 36 inches. It is equipped with lock-link hook ends for a safe grip. Other operating features are similar to those of other models in the complete Simplex line. These include the spring-operated plunger which firmly engages the pawl or dog with the ratchet wheel. Reversing the jack quickly slackens the chains or cable

The new ratchet is designed to bind loads on trucks or flatcars and to do heavy-duty pulling or hold-down jobs in construction. In marine jobs it serves as a hitching tow for boats, barges, and floats; a guy hold-down for masts and derricks; and to tie pilings and bents together.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 22.

Load-Transfer Assemblies

A bulletin presenting the Godwin load-transfer assemblies for concrete pavement joints has recently been issued by Richmond Screw Anchor Co., Inc., 816-838 Liberty Ave., Brooklyn 8, N. Y. It gives a full description of contraction and expansion joints as well as methods of assembling and installing, and analyzes the action of load-transfer assemblies. Detailed engineered drawings illustrate recommended installations for all types of joint assemblies.

The cause and effect of damaging stresses in concrete pavement are also described in the bulletin, as are the controlling factors of load-transfer assemblies.

The catalog discusses corrosion and construction shrinkage hazards, and includes a state highway department's comparative laboratory tests on the conventional 1 x 18-inch dowel and supports, the Godwin 1 x 6-inch dowel and No. 1 wire stress-reducing supports, and the Godwin 1 x 6-inch dowel and ⅜-inch deformed stress-reducing supports.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 144.

Worthington Ups Pruneau

Howard H. Pruneau has moved up from Sales Engineer to Construction Equipment Regional Supervisor in the midwest for Worthington Pump & Machinery Corp., of Harrison, N. J. He succeeds H. J. Schultz, who resigned.

Asphaltic Concrete Improves Main Road

Hot-Mix, Granular Base, and Grading by Contract Boost Traffic Capacity of Interstate Highway

✦ WHEN the Utah State Road Commission called for construction bids last spring on a new 4-lane section of U. S. 89, 50, and 91, Utah contractors bid high because they thought it would be difficult. When Strong Co. of Springville was low with a bid of $356,957, other contractors shook their heads and doubted whether they had erred on their higher bids.

But Strong Co. made excellent progress, and what would normally have been a tough project was simplified and made routine by good management. The work was completed as much as possible as it went along. Strong's equipment performed production miracles. For example, its asphalt plant is rated at 800 tons per shift, but Strong Co. made it produce from 925 to 1,000 tons every 8-hour shift it worked. The company was shooting for a weekly average of 1,000 tons a day.

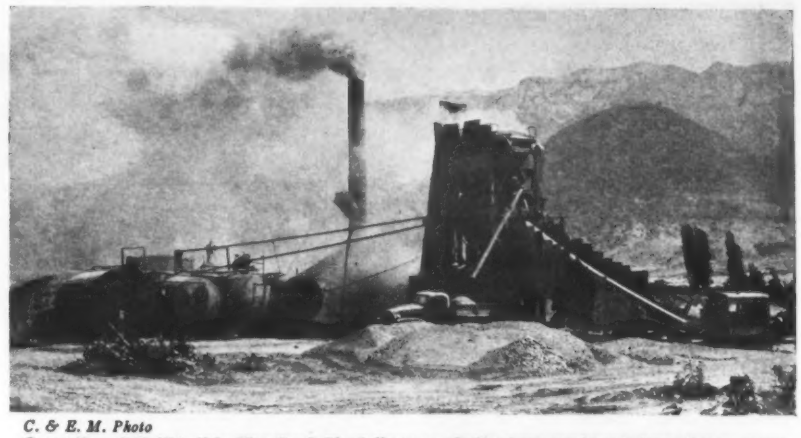
Strong's contract called for the grading, drainage, sub-base work, and surfacing on nearly 7 miles of the main north-south interstate route between Provo and Pleasant Grove, Utah. This route carries most of the heavy traffic going west and north toward Salt Lake City. Built originally as a trail by Mormons under Brigham Young, the route became a concrete road more than 20 years ago. There have been so many changes and improvements over the years that the Federal-Aid number of F 124 (12) on this contract indicated that this was the twelfth time the Federal government had helped to finance improvement work here.

Made a 4-Lane Road

Strong's contract work reconstructed the existing highway, and made a modern 4-lane thoroughfare. Through the city of Orem there are 13,000 feet of asphaltic-concrete pavement 98 feet wide, from curb to curb. The city of Orem financed its own part of the agreement, which provided that the city would construct the curbs and gutters along the pavement edge. This work was completed ahead of the contractor.

The remainder of the project outside the Orem city limits is paved 50 feet wide, with a 10-foot compacted granular rock shoulder on each side of the highway. Right-of-way was arranged after a long, painstaking study. The route follows the old alignment, and the old concrete slab is in the center of the improved construction. It was covered by asphaltic-concrete hot-mix.

The asphaltic-concrete paved surface, 3 inches thick, was laid on a compacted, waterbound granular sub-base, primed with liquid asphalt before the hot-mix was laid. The State required high densities on the earth embankment, and a minimum of 6 inches of granular sub-base was included in the design to cushion the pavement over the subgrade, and aid in load distribution.



C. & E. M. Photo
Operating full tilt, this Standard Steel Corp. asphalt plant produced from 925 to 1,000 tons every 8-hour shift it worked on the Strong Co. contract.

Grading and Sub-Base Work

The job began officially on March 7, 1949, with 225 working days to go, when Strong moved the first grading equipment in to commence subgrade construction. The grading fleet was comparatively small, consisting of three

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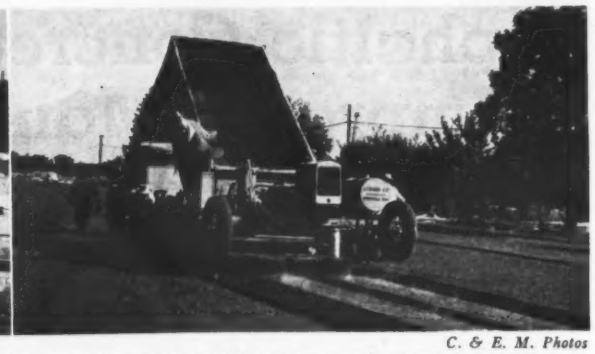


C. & E. M. Photos

On the Strong Co. job in Utah, a 12-ton 3-wheel Huber roller smoothed and compacted rock base ahead of paving (photo at left). The crushed-rock sub-base received a prime shot of MC-1 (middle photo) and an Adnun Black Top Paver laid the hot-mix.

Asphaltic Concrete Improves Main Road

(Continued from preceding page)

Super C Tournapulls, two Caterpillar No. 12 motor graders, a D8 pull cat with a snatch hook to assist in Tournapull loading, a 4,000-gallon water tank truck, and two flat-wheel rollers.

With the exception of a mud hole near Linden, most of the grading was in excellent material. It dug easily, it spread well, haul roads an average of a mile long were easy to maintain with the motor-grader blades, and spring rains gave the dirt-movers a break by putting in some of the moisture. The mud pockets near Linden were excavated successfully, but they did slow the equipment down by about 30 per cent.

Grading was finished, insofar as possible, as it progressed. Much of the construction area had to carry normal traffic, so it was to everybody's advantage and good temper to keep the construction areas closed up as much as possible, while still giving the fast rubber-tired equipment room to maneuver.

Crushed material for the granular sub-base was turned out of a new 10-acre gravel pit, recently purchased by Strong, and hauled by trucks out to the road. The crushing and screening plant which produced the material is detailed in an article on page 71.

The big 18-ton loads were spread by tail-gating to measured marks, and then the material was road-mixed, waterbound, and spread out in thin lifts not more than 3 inches in thickness. Each lift was thoroughly rolled by a 3-wheel 12-ton Huber machine.

Excellent progress was made. By the middle of July much of the sub-base was in, and hot-mix paving had already begun.

A High-Capacity Hot Plant

A high-capacity asphalt plant, rated by its manufacturer at 100 tons per hour, is one of the reasons why the project made such rapid progress. The rated capacity of the Standard Steel Corp. plant was exceeded slightly, and it turned out some good tonnages. In five consecutive days of 8 hours each, about the time CONTRACTORS AND ENGINEERS MONTHLY visited the work, the plant turned out 981, 943, 1,010.9, 1,022.3, and 1,003.75 tons.

That high tonnage was handled adequately by large Mack trucks, which hauled 18 tons at a trip, and by an Adnun Black Top Paver which laid the material on the highway. In fact, the contractor exceeded the intent of the specifications by going to the expense of laying part of the pavement down as a leveling course, to make the work easier for the Adnun machine.

Materials for the Mix

The materials for the hot-mix consisted of two sizes of crushed rock aggregate, mixed with 5 per cent by weight of 200-300-penetration asphaltic cement. The batch consisted of 1,590 pounds of ¼-inch fine rock, 1,410 pounds of 1-inch-minus coarse rock, and 150 pounds of asphaltic cement. Standard Utah specifications for hot-mix call for the following gradation of the aggregate:

Size Mesh	Per Cent Passing
1-inch	100
¼-inch	85-100
No. 4	45-65
No. 10	30-50
No. 200	5-10

Asphaltic cement used in the mix was a product of the Salt Lake City refinery of Wasatch Oil Co. It was hauled in by trucks, under a transportation arrangement with Clark Tank Lines of Salt Lake. This trucking firm has equipment to furnish practically any size of load, but on this project the firm generally hauled two 5,000-gallon loads of asphalt at a time. The No. 5 fuel oil shipments came 4,000 gallons at a time.

Materials-Handling Facilities

The asphalt arrived at the plant at a temperature close to 300 degrees, which was well over the minimum pumping limit. It could therefore be unloaded by gravity, simply by pulling the transports up on an earth ramp alongside the two 6,000-gallon horizontal asphalt storage tanks. The fuel tank, of the

(Continued on next page)

same capacity, was also available to this unloading ramp. All the tanks were heated by a central boiler, which circulated steam through coils. One ready tank was kept at a constant temperature of 300 degrees.

The mineral aggregates were produced adjacent to the hot plant, and the overflow chute of the transfer bin was only 125 feet away from the cold trap on the Standard Steel Corp. asphalt plant. This made it very easy to feed the trap with a bulldozer blade, or to haul by trucks and dump directly into the trap if necessary. With the high output, both methods were sometimes used simultaneously.

A 6-foot-diameter Armco pipe, with gates installed in its roof, was used at the hot plant to inclose the belt-conveyor feeder. The tunnel was so arranged that it could be dismantled quickly in case of a major move.

Asphalt-Plant Details

Known as the Standard 3,000-pound asphalt plant, the hot-mix arrangement embodied standard and auxiliary equipment. Certain changes were made to put independent power on the several functions of the plant, giving it a great deal of flexibility. For example, the operator could slow his drier down a little to pick up more heat on the rock, if that was necessary.

The plant itself consists of a belt conveyor which puts the rock into the single drier, a fuel-oil-fired drier, a hot elevator 50 feet high, sizing screens, a pugmill, and weighing equipment.

The plant pugmill mixer is run by a Buda power plant, connected by flat-belt drive. The single drier is turned by an International UD-14 diesel engine, and the feeder conveyor gets its motive power from a Wisconsin 4-cylinder air-cooled gasoline engine.

The main boiler is a horizontal, portable water tube type, of 110 hp, and is fired by heavy No. 5 fuel oil. This boiler furnishes all the steam for heating the asphalt, it heats the pugmill, atomizes the fuel on the drier, operates the gate ram on the pugmill, and drives three auxiliary pumps. These include a Fairbanks-Morse water pump, a National Transit fuel supply pump, and a Worthington asphalt pump which keeps the bitumen looping in a continuous stream between the supply tanks and the hot well at the pugmill.

It was a clean set-up, so arranged that the prevailing winds drifted the stack fines away from the plant rather than over it. Only a minimum of material fines escaped through the stack, and there was never any smoke.

A spare 500-cfm Le Roi compressor, which often sits idle in Strong's yard at Springville, was moved to the asphalt plant. In the morning especially, when the air was heavy, this compressor was started and its entire output directed through the drier by means of a discharge nozzle alongside the burner. This soon set up a terrific draft and started a desirable up-sweep of the air blast, resulting in a hot drier which operated at capacity in unfavorable atmosphere.

The same compressor was also used as a force-feed blower to get up steam in the morning. When it was used with the boiler burners, a full head of steam was possible in about 35 minutes' time. This method was used, and no night fireman was necessary. The regular-shift fireman came out ahead of the crew just far enough to have everything hot when they arrived. The plant usually operates at forced draft when capacity tonnages are expected, but it will also operate without it.

The plant crew included an operator, a fireman, an oiler, mixer operator, and one laborer, in addition to the cat-skinners out in the pit. The Standard asphalt plant is fairly new, having done a 7-mile job on Scipio Hill 200 miles south of Salt Lake City, and one 17-mile hot-mix project between Carlin and Battle Mountain, Nev.

Movement of Material

In passing through the hot plant, the aggregate first went from the primary trap over a 24-inch belt conveyor, where it was dropped directly in the drier. There the rock was heated and retained until it had lost its moisture, but was not heated beyond that point. A progressive plant inspector, alert to the danger of over-heating asphaltic-concrete aggregates, demanded only the lowest minimum temperature at which the moisture would be removed and the mix produced. This temperature on rock is usually somewhere around 275 degrees F, and is seldom over that.

From the drier, the aggregate dropped to a bucket-line hot elevator about 50 feet high, enclosed to retain the heat. This elevator dropped the material on the upper deck of a set of vibrating screens 42 inches wide x 10 feet long. The screen was split into two equal parts, half being covered with ¼-inch mesh and the other half with 1-inch. The bottom screen deck was not used, since this was a 2-bin pull.

Oversize material scalped out of the mix by the 1-inch screen was negligible, since a 1-inch screen was also used in the rock plant. The aggregate, fairly well graded and to specification size, then passed to the plant storage bins, where it was weighed on Hardy scales and sent to the pugmill. There it got a 30-second mix with the hot asphaltic cement before being dumped out to the waiting Mack trucks.

No built-in thermometers were employed in the plant itself, but the heat loss in the aggregate, from the discharge end of the drier to the pugmill, was well established to be practically negligible. Many readings were made each day with a hand thermometer, especially at the truck bed. At the time the mix discharged into the waiting truck, it had to be at a temperature of 240 degrees, and special attention was paid to that result. A tolerance of only about 10 degrees plus or minus was allowed.

The asphaltic cement, of course, moved in a continuous loop by means of the Worthington asphalt pump, and the material was drawn off at the hot pot as needed. It too was weighed.

The four Mack trucks, which were usually employed on the 3-mile hot-mix haul, generally took 11 batches, for a net weight of about 16½ tons. If the haul was a little longer, or one of the trucks was temporarily out of commission, the plant man dumped as high as 13 batches in one load, although this practice was held to a minimum. It overloaded the trucks and jumped their maintenance cost.

Laying the Hot-Mix

The asphaltic concrete was laid by working one 4,000-foot-long section of the highway at a time, until it was completely paved. This section was first marked off by traffic-control barricades to keep automobiles out of the prime oil. On the existing portland-cement-concrete pavement which was being

(*Concluded on next page*)

The new Thor 35-pound-class sinker rock drill in action.

Sinker Rock Drill

A new Model 35 sinker rock drill has recently been announced by the Independent Pneumatic Tool Co., 175 State St., Aurora, Ill. The new Thor 35-pound-class drill incorporates all the features of five previous sinkers in the Thor line, the company states. It has, in addition, the new lower valve for full-line pressure blowing. Overall length is 21¾ inches, making a ¾-inch air hose and a ½-inch water hose. Standard chuck size is ⅞ inch hexagonal by 3¼ inches. Optional chuck size is ⅞ inch Q. O. x 3¼ inches.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 80.

Low-Heat Welding Rods

Metal-joining information on Eutectic low-temperature welding alloys is now available in the "Directory Welder for 1950" offered by Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y. Featuring 65 EutecRods for torch welding and EutecTrodes for arc welding, the issue is illustrated with job histories.

Among the products listed is a new line for stainless-steel arc welding, which is designed for high-quality welds at low amperages, without damage to base metal. These electrodes are known as Eutec-Staintrodes and are available for all types of low-heat stainless-steel welding, depending upon the composition of the base metal. The 8-page bulletin gives a complete description of more than 100 low-heat welding alloys. A complete selection chart is also included for information on Eutectic's specialized welding alloys for particular jobs.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 23.

Asphaltic Concrete Improves Main Road

(*Continued from preceding page*)

covered, a prime coat of 0.1 gallon of RC-4 asphalt was used, while the crushed-aggregate sub-base prepared by Strong's men previously got 0.5 gallon of MC-1 per square yard. The priming was so arranged that it could cure about 24 hours before traffic was routed over the oil, at which time the other half of the section under construction was shot.

In the rough and uneven places marked by the old concrete pavement, Strong laid a leveling course and smoothed it with a Caterpillar No. 12 motor grader blade. This then made the section ready for high-gear laydown work.

The loads of hot-mix from the asphalt plant were spread by an Adnun Black Top Paver, widened to 12½ feet. The big trucks fitted the Adnun hopper perfectly, and they dumped gradually without difficulty. Through Orem, where the machine was working to curb lines, it had a ready-made reference point from which to work. On the other 50-foot width, the first course was laid to a string line established by the state survey party, and subsequent strips met that edge.

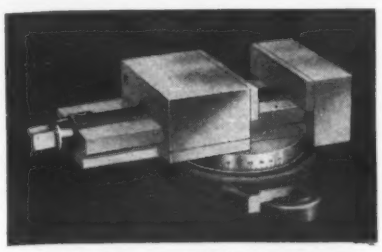
Approximately an inch of extra thickness on a 3-inch compacted course was allowed at the time of laydown, to give the required thickness when the material was compacted. Pavement thickness can be controlled when using the Adnun machine by a screw-up type of adjustment on each side, and additional hydraulic controls.

A Buffalo-Springfield three-axle tandem, 10-ton machine did the compaction work. It always worked from the outer edge of pavement toward the center, blanket rolling once during the first day and then giving a complete roll the second day. The joint was rolled by lapping about 12 inches over on the hot stuff. Especial attention was paid to the possibility of shoving the material while too hot, and over-rolling it initially to the point where cracks were set up.

The construction joints, made at the end of a day's work, were cut back square before work was resumed, as is now usual procedure on construction of this type.

Personnel

Roy W. McLeese, Utah's Chief Engineer, had general charge of the work, with R. W. Griffiin as Construction Engineer and Rube Simpson as Resident Engineer. Lyman Robbins is General Superintendent for Strong Co., John Strong is in charge of the asphalt plant, and Bill Landry, former 30th Battalion Seabee associate of the Western Editor of this magazine, is the asphalt-plant operator.



This is the new South Bend small swivel vise for holding work on shapers, milling machines, drill presses, etc.

Small Machine Vise

A newly designed small swivel vise for holding work on shapers, milling machines, drill presses, and other machine tools has been announced by the South Bend Lathe Works, 114 E. Madison St., South Bend 22, Ind. The vise jaws have replaceable hardened-steel inserts 4 inches wide and 1 inch deep. Maximum jaw opening is 4 inches.

The base has two open slots spaced 7½ inches apart for bolting the vise to the machine table. The vise swivels on the base and has 180 degrees of graduations, reading from 0 to 90 degrees right or left. Positive swivel locking is provided by two socket-head screws and plug binders. A wrench is included for operating the vise.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 45.

Diesel School Offers On-the-Job Training

Many contractors haven't the time or facilities to train their service men in proper maintenance practices once a job is started. Detroit Diesel Engine Division, manufacturer of General Motors diesel engines, has stepped up to the situation with two mobile diesel engine training schools manned by competent factory instructors. Each unit consists of a GMC 2-ton cab-over-engine truck carrying all the equipment needed for a two-day course in advanced diesel engine mechanics. The equipment can be unloaded from the truck and set up ready for school in half an hour.

A 3-cylinder cutaway engine makes it easy for trainees to see and thoroughly understand the construction and operation of the GM 2-cycle diesel engine. After instruction in engine tune-up and diagnosis has been given, another engine is thoroughly gummed-up by the instructor and the class works to locate its troubles and get it running smoothly again. Monometer testing apparatus, sub-assemblies, charts, movies, slides, and many other items contribute to the effectiveness of the course. Service problems peculiar to the job at hand are discussed and methods advanced for their solution. Demonstrations are made of simple preventive measures that help eliminate costly breakdowns and keep expensive equipment on the job at maximum efficiency.

One of the schools recently visited Downsville Dam, New York City's huge water supply project, where 110 pieces of diesel-powered equipment are in operation. There employees of B. Perini & Sons, Walsh Construction Co., and their subcontractors attended the two-day session.

Other projects visited by these schools include Garrison Dam, Neversink Dam, mining projects of the Mesabi Range, Cherry Creek Dam, Aspen Tunnel, and many others both east and west of the Mississippi River. The schools operate throughout the year on schedules arranged through the Division's distributors and dealers.

Further information may be secured from the Detroit Diesel Engine Division, General Motors Corp., 13400 West Outer Drive, Detroit 28, Mich. Or use the Request Card at page 16. Circle No. 19.

Detroit Diesel's mobile diesel engine training schools carry all the "classroom" equipment needed for a two-day course in advanced diesel engine mechanics.

The Jarp V-type snow plow is designed especially for breaking through deep snow and widening high drifts.

New Snow-Plow Line

A new V-type snow plow for use with International, Ford, and other makes of trucks has recently been offered by the Jarp Corp., of Wausau, Wis. Designed especially for breaking through deep snow and widening high drifts, the new plow features all-welded construction, alloy-steel moldboards, and smoothed surfaces for fast discharge and minimum resistance. The plows are made in 8-foot and 8-foot 6-inch widths.

The new line also includes one-way rigid, one-way trip, and reversible models, available for use with all trucks having a capacity of ½ to 5 tons.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 155.

Catalog on Scaffolding

An 8-page catalog on steel scaffolds and accessory equipment is offered by Safway Steel Products, Inc., 6229 W. State St., Milwaukee 13, Wis. The unit parts described and illustrated in the folder include end frames, open end frames, extendable end frames, putlogs, putlog supports, straddle trestles, ladder sections, horizontal braces, base plates and casters, and other accessory equipment. Diagrams illustrate the total leg loads or uniform loads that may be applied to the component sections. Keeping in mind that a high degree of safety built into equipment will not always offset carelessness on the part of the erector or workman, Safway has included in the catalog a list of 23 safety rules and regulations that should be observed.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 42.

New Locomotive Crane

A new 25-ton diesel-electric locomotive crane is announced by the American Hoist & Derrick Co., St. Paul 1, Minn. The American Model 825 DE features an electrified car body with two powerful electric motors driving the truck axles through reduction spur gears and pinions sealed and running in oil. Other features include full-vision cab, enclosed roller-bearing turntable, finger-tip air controls, efficient deck layout, and anti-friction bearings.

All deck operations are diesel-powered directly from the engine. Travel is by electric motors mounted in each truck. A direct-connected traction-type generator supplies the current. The electric-starting diesel is rated at 125 hp at 1,600 rpm. Maximum travel speed is 10¾ mph.

Further information may be secured from the company by requesting Catalog No. 600 L-8. Or use the Request Card at page 16. Circle No. 136.

All deck operations of the 25-ton American DiesElectric locomotive crane are diesel-powered; travel is by electric motors mounted in each truck.

Left to right: R. S. Over, Dale W. Detwiler and Emmert I. Detwiler, all of New Enterprise Stone and Lime Company, discuss the day's operations.

Rigged with strong wire rope, this powerful shovel swings a big bite of earth toward waiting truck. Old road is shown at right.

Public Work to Reach $6 Billion This Year

Buildings, Sewer and Water Works, Conservation, Reclamation, Highway Projects Are on the Upswing: Private Construction Expected to Decline

✦ ASSUMING no depression, no war, no economy-shaking strikes, new construction will reach $19,000,000,000 this year as it did last. Equally heartening is the rest of a 1950 forecast hazarded in *Public Construction*, the December issue, by J. W. Follin, Special Assistant to the Administrator, General Services Administration.

Public construction, he predicts, may well account for 31 per cent of the total, or $6,000,000,000 (an increase over the 1949 ratio of 27 per cent). And state and local public construction will account for the larger portion, or about $4,100,000,000 of the $6,000,000,000.

Here are the figures in table form:

New Public Construction Forecast—1950
(Millions of Dollars)

	Forecast 1950	Estimate 1949
Total public	6,000	5,275
Federally financed	1,900	1,590
State-locally financed	4,100	3,685
Residential	400	220
Nonresidential building	1,925	1,675
Educational	950	855
Hospital and institutional	550	460
Other	425	360
Military	100	120
Highways	1,800	1,650
Conservation and development	850	745
Sewer and water	625	575
Public service enterprises	100	98
All other	200	192

All Types on the Increase

Public works construction of all types will increase in 1950—as it did in 1948 and 1949—in answer to the tremendous needs created by depression and wartime deferment, our population growth and cross-migration, our rate of family formation, and our higher standard of living. This will be particularly true for public housing and for school building—estimates have it that our elementary school population in 1957 will be about 50 per cent greater than in recent years. Hospital work, too, will be on the upsurge.

Same for sewer and water works, since existing facilities are already taxed. Also, the Federal program to alleviate water pollution could well have a great influence on the future level of sanitation construction.

Activity will be vigorous during 1950 in long-range construction—conservation, reclamation, river and harbor work, flood control. And highway construction will continue to increase, though perhaps not as much in 1950 as in recent years.

Highways

For many years past, highway work alone has accounted for 45 to 50 per cent of all public construction. But 1949 marked a significant shift: the volume of public nonresidential construction was higher than that of highways. And it will be again this year, says the GSA. Highways will account for only about 30 per cent of the total.

Materials, Labor, Costs

Plenty of materials. No labor shortages of note. Higher productivity. Costs steady—maybe a bit lower than in 1949. That's the outlook . . . with the greatest single limitation (still barring depression, war, and crippling strikes) the financing ability of state and local governments, plus the pressures of military expenditures and foreign aid on the Federal budget.

Hauling 6 to 8 cubic yards of road fill, these six Mack LJX dumpers are operating under the jurisdiction of the Atomic Energy Commission at the West Milton area of the Schenectady, N. Y., Atomic Research Laboratory.

Private Construction

Both the Departments of Commerce and Labor on the Government side, and the F. W. Dodge Corp. on the private side, expect a reduction in the 1950 volume of private construction. Even if we reach the 1949 number of private housing starts, a decrease in the housing dollar volume is possible because of smaller and lower-priced units, some lower material costs, and some increase in productivity. As in 1949, the volume of private plant construction will fall off now that many concerns have completed their expansion plans. And the volume of private utilities expansion, which rose in 1949, will dip during this year.

Local situations may differ, but this is the national picture as the GSA sees it.

Canadian Plant for Nelson

The establishment of the Nelson Stud Welding Co. of Canada, Ltd., with manufacturing facilities in Toronto, has been announced by Nelson Stud Welding Division of Morton Gregory Corp. and its recently appointed Canadian distributor, the Rudel Machinery Co., Ltd. Richard C. Blankmeyer, Nelson Field Engineer, will coordinate the activities of the Canadian branch and the distributing agency.

Self-Locking Screw

A new self-locking set screw and adjusting screw called Zip-Grip—said to require no lock nuts, wires, impinging locking screws, deformed or riveted threads—is announced by the Set Screw & Mfg. Co., 327 Main St., Bartlett, Ill. The new screw is specifically designed for set-screw applications in which excessive vibration is a factor, and for regulating and adjustment applications in which instantaneous locking at a precise point is desired.

The Zip-Grip is described by the company as the first set screw to have triple-locking action by a combination of interference fit, tension, and the locking of the set screw against the shaft. It is available in all metals, including soft or hard steel, case-hardened or heat-treated, stainless steel, brass, bronze, or aluminum. It may be had with any type of head.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 82.

From now on, 21,000 more Wolverine rooters and boosers—97,000 in all—can yell their lungs out in the University of Michigan football stadium. An all-welded steel seating section has been added to the concrete structure.

Welding Adds Seats To Michigan Stadium

To accommodate the increasing crowds of loyal fans and not-so-loyal rivals of its famous Wolverine football team, the University of Michigan at Ann Arbor has increased the seating capacity of its football stadium from 76,000 to 97,000 by adding an all-welded steel seating section on top of the present concrete stadium.

Steel plates ¼ inch thick were formed into a single-step section and then shop-welded into 4-step units. These 4-step units in turn were welded together in the stadium. Each preformed steel step section, approximately 15 feet long, is welded with a solid continuous weld to the section immediately below as well as to the section adjacent to it. The welded step sections are supported by a welded steel substructure.

There was an estimated total of 12 miles of welding, 7 of which were performed in the field. All field welding was done with Lincoln welding machines and electrodes. The horizontal fillet welds and the flat butt welds between step sections were made with Fleetweld No. 11; the vertical welds on the step risers of the sections were made with Fleetweld No. 5.

Steel supports are welded to the step sections and wooden seat boards fastened to these supports to complete the stadium extension. The original concrete stadium and the welded extension were designed by the Osborn Engineering Co. of Cleveland. The steel was furnished, erected, and welded by Whitehead & Kales of Detroit. General contractor was Henry de Koning Construction Co., of Ann Arbor.

Adjustable-Speed Drive In Varied Packaged Units

A 24-page two-color booklet summarizing the benefits which various branches of modern industry can expect from properly applied adjustable speed is available from the General Electric Co., Schenectady 5, N. Y. Titled "Adjustable Speed", it provides a convenient check list of points to consider in selecting an adjustable-speed drive, and gives a clear picture of various packaged units—their range of application and performance features.

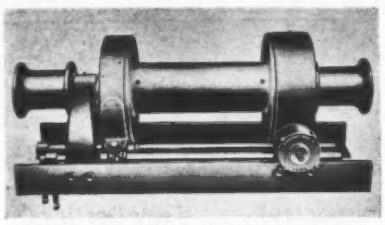
Extensively illustrated with photographs, charts, and diagrams, the booklet contains case histories of how adjustable speed has stepped up production, made machines more versatile, and helped turn out better products. Other features of adjustable-speed drives, such as reduced waste of material, lower maintenance, simple operation, minimum space requirements, and low cost of modernization, are also described and illustrated.

Equipment covered in the publication includes ac and dc adjustable-speed motors, packaged adjustable-speed drives, and various electronic devices which provide adjustable speed. The booklet concludes with a two-page fold-out comparison chart showing the performance features and characteristics of five adjustable-speed drives, a varying-speed drive, and a multi-speed drive.

This literature may be obtained from the company, or by using the Request Card which is inserted at page 16. Circle No. 31.

Ideco Vice President

George W. Walton has been named Executive Vice President and a director of the International Derrick & Equipment Co., a subsidiary of Dresser Industries, Inc., Dallas, Texas. Walton joined Ideco in 1944 as Vice President in charge of the company's Machinery and Export Sales Division.



Several new design changes mark the Ramsey J-20 10-ton truck winch, which is suitable for mounting on trucks of 1¼ to 3-ton rating.

Ten-Ton Truck Winch

A new heavy-duty truck winch incorporating many improvements has been developed by the Ramsey Winch Mfg. Co., Box 3035, Tulsa 8, Okla. The Model J-20 (illustrated) carries a safe-working-load rating of 20,000 pounds, and is suitable for mounting on trucks of 1½ to 3-ton rating. Other J Series models soon to become available will be of 6,000, 10,000, 15,000, and 30,000-pound sizes.

The overall appearance of the J Series winches is somewhat different from that of other winches because the gear case is built flush with the drum, and all reinforcing is on the inside of the gear case rather than on the outside. This gear-case design, Ramsey says, makes it impossible for winch line to become wedged between the case and drum. Air space inside the gear case is greatly increased to permit more efficient heat dissipation and thereby increase the life of the worm gears. The gear case and all other castings are of certified malleable iron, including capstans. Angular contact ball thrust bearings are used on the one-piece worm and shaft.

The lower pressure angle of the Ramsey worm and gear, plus the positive action of the Ramsey automatic oil-cooled safety brake, enables the winch to deliver power with added safety. Ratio of the worm and gear is 40 to 1—slightly slower than most winches. The slower ratio produces a more even pull at a more desirable line speed, the company says.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 84.

Small Mortar Mixer

A new 3-cubic-foot-capacity plaster and mortar mixer is announced by Muller Machinery Co., Metuchen, N. J. Although designed particularly for the small mason contractor, it is convenient for use on larger jobs where the mixing operation is decentralized to save time in handling mixed materials. Its low charging height is 32 inches; its width is 29½ inches.

Powered by a Model 9-R-6 Briggs & Stratton air-cooled engine, it is driven through a roller chain and machine-cut gears. This mixer may also be obtained with a 1-hp electric motor for plugging in a light socket for inside use. The engine house is split for accessibility to the driving mechanism. The tires are 4:00 x 8 on disk wheels with roller bearings.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 91.

Utility-Size Trencher

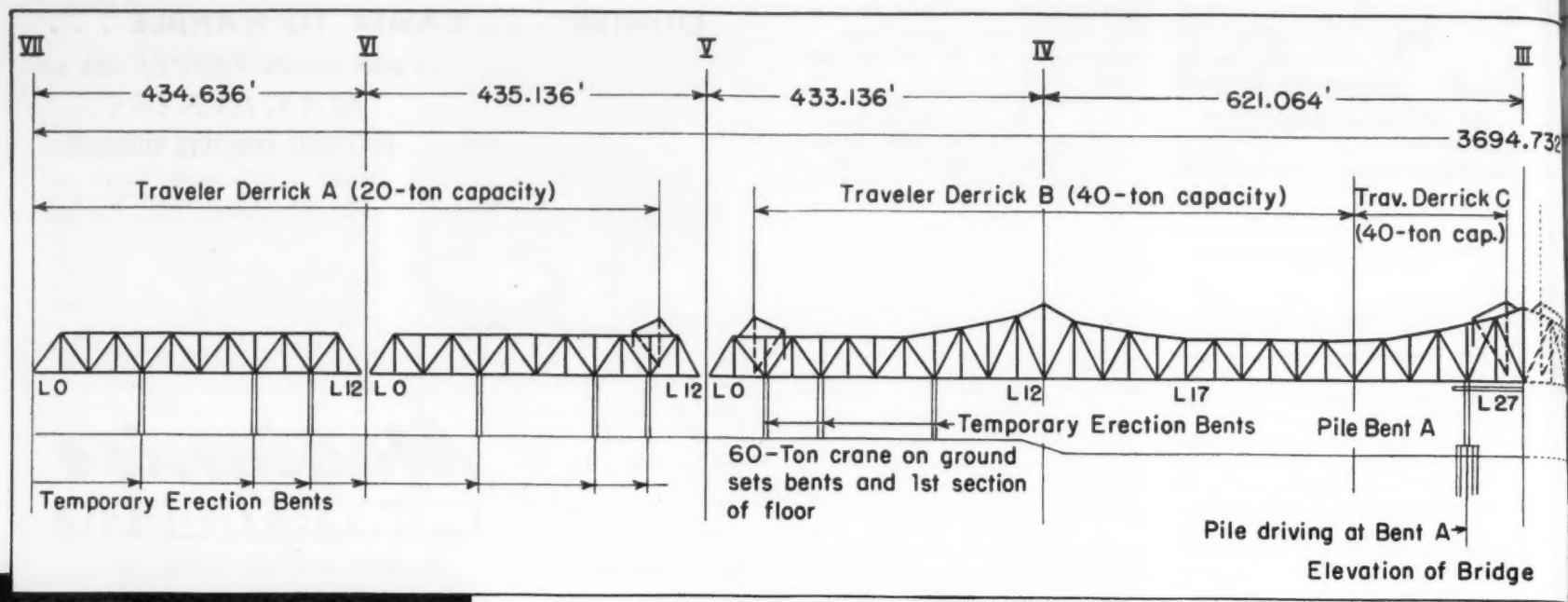
The utility-size rubber-tire-mounted Model 80 Trenchmobile is described in detail in an 8-page catalog recently issued by the Parsons Co., Box 431, Newton, Iowa, a subsidiary of the Koehring Co. of Milwaukee. Powered by a 31-hp 4-cylinder gasoline engine, the Trenchmobile is equipped to dig in eight separate feeds from 1.7 to 14.6 fpm, 5 or 8 inches wide, and a maximum of 4 feet deep. Features described in the folder include automotive-type steering and direct mechanical drive through enclosed friction clutches for raising and lowering the box-type boom. Equipped with the optional dozer blade, the Trenchmobile can be used for backfilling.

Photographs show the Trenchmobile at work on heavy-duty construction; installing conduit, off-street connections, gas lines, and water services; and in airport, railroad, and municipal maintenance work. Schematic diagrams and engineering specifications provide a concise summary of the unit's design and performance.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 33.

Woods Joins Marlow Pumps

A. F. Woods has joined Marlow Pumps, Ridgewood, N. J., as District Sales Representative. His territory includes Kentucky, Ohio, eastern Indiana, and eastern Michigan; his headquarters are in Birmingham, Mich. Mr. Woods was formerly District Sales Manager for Yale & Towne Mfg. Co.

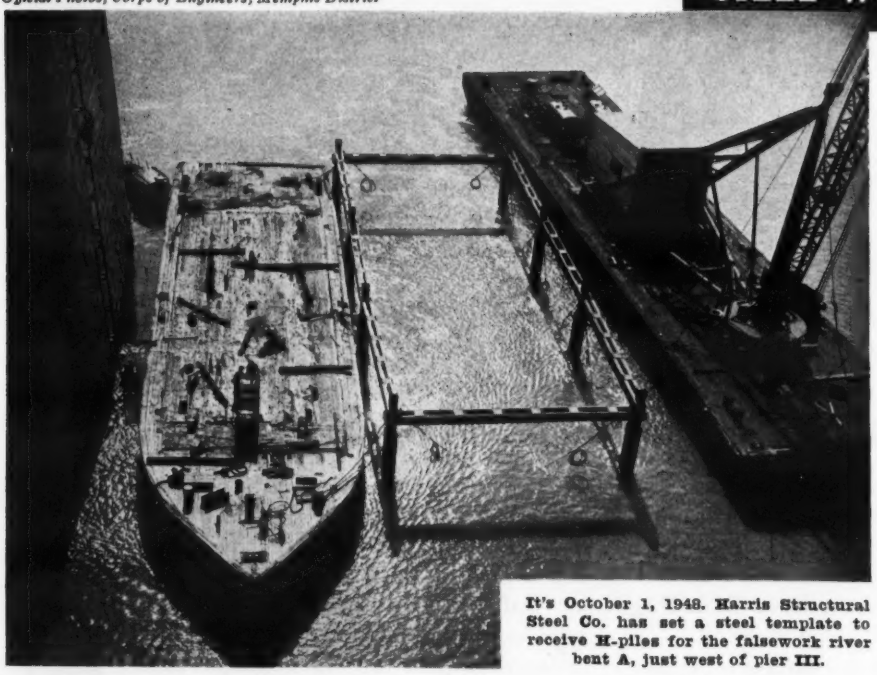


ON THE DRAWING BOARD
ELEVATION VIEW

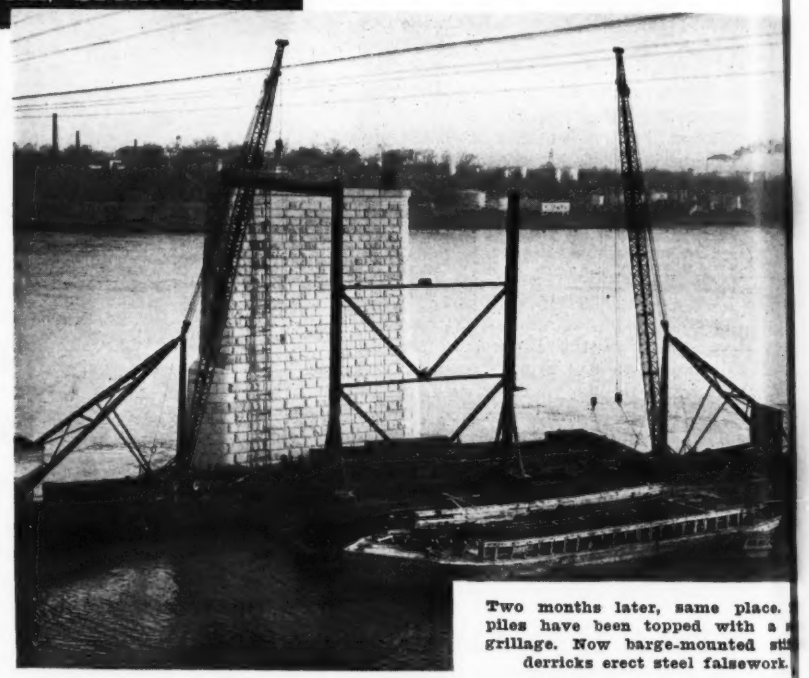
Official Photos, Corps of Engineers, Memphis District

ON LOCATION
STEEL WORK, SPAN III-IV

By WILLIAM H. QUIRK,
Eastern Editor



It's October 1, 1948. Harris Structural Steel Co. has set a steel template to receive H-piles for the falsework river bent A, just west of pier III.



Two months later, same place. piles have been topped with a grillage. Now barge-mounted stiffderricks erect steel falsework.

Meanwhile, at pier IV 621 feet west derrick B has reached panel joint 12 with the cantilever construction and has 7 more panels to go. It is January 20, 1949.

Eleven
III, an
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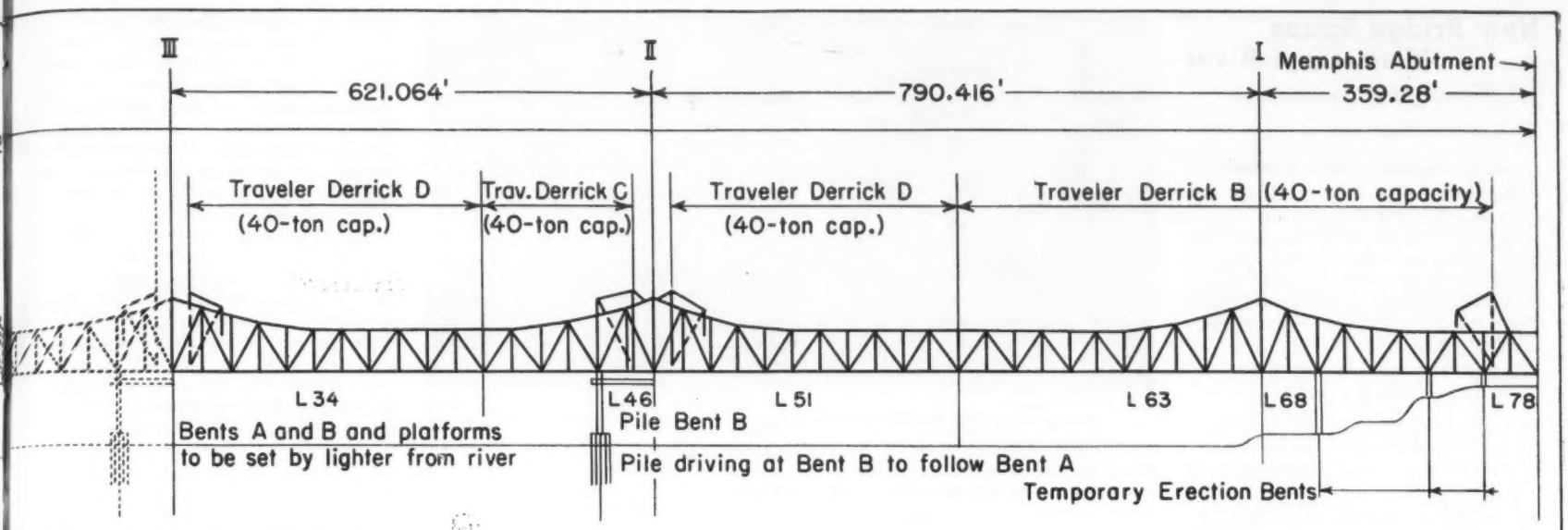


showing erection of main steel.

New Bridge Spans Mississippi

Harris Structural Steel Co. Used Four Derricks on Superstructure for Memphis Highway Bridge

✦ AT Memphis, Tenn., the newest and largest vehicular bridge over the Mississippi River was completed near the end of last year after four years of construction activity. Officially named the Memphis and Arkansas Bridge, the steel cantilever structure linking the east and the west is nearly a mile long between the Arkansas and Tennessee abutments. It carries two 24-foot roadways separated by a 3-foot divisor, with a 5-foot walk on each side. The total cost, including approaches, is approximately $15,000,000.

Work on the project got under way in the fall of 1945 when Merritt-Chapman & Scott Corp. of New York City and New London, Conn., was awarded a contract for the main substructure. The granite-faced concrete piers and abutments were completed in December, 1947. A contract for furnishing and erecting the steel superstructure for the main portion of the bridge was awarded to the Harris Structural Steel Co. of New York City on its low bid of $4,605,885. Steel shortages delayed the start of erection until August, 1948.

The states of Tennessee and Arkansas jointly constructed the bridge, while the consulting engineering firm of Mojeski & Masters of Harrisburg, Pa., designed the structure and supervised its building.

This is the third bridge spanning the Mississippi at Memphis. All three closely parallel each other with their tiers on line for ease of navigation, and with their center lines 200 feet apart. The Harahan Bridge is the northerly structure, and is owned by the Arkansas & Memphis Railway Bridge & Terminal Co. Designed and constructed primarily as a railroad bridge, the structure also carried a "wagon-way" on each side of the tracks. It was built between 1913 and 1916, and up to the present has been the only vehicular crossing at Memphis. The center structure is a railroad bridge and carries the tracks of the Frisco Lines. The new bridge is

(*Continued on next page*)

Arkansas and Tennessee Have Several Contracts For Bridge Approaches to Memphis Highway Span

✦ WITH the new Memphis and Arkansas Bridge over the Mississippi River scheduled for opening in January, 1950, the Highway Departments of Arkansas and Tennessee, the two states sponsoring the project, have been pushing work on the approaches. In the open country on the Arkansas side, a dual-lane limited-access highway takes off from the bridge and continues for over 2 miles on U. S. 70 westward toward West Memphis, Ark. On the eastern end, where the bridgehead is located in the cotton city of Memphis, Tenn., the approach is much more complicated. Facilities of all sorts were encountered in building a connection from the bridge to the open highway east of downtown Memphis, which is spread out along the river.

On the Arkansas side, the approach fill to the existing Harahan rail and vehicular bridge at Memphis was a two-lane rough-riding broken-down pavement. The embankment was constructed with fill taken from borrow pits excavated along the toe-of-slope line. The pits, 16 to 18 feet deep and filled with backwater from the Mississippi, were recently filled in when the Arkansas Highway Department awarded a 1,500,000-yard dredging contract to the Sternberg Dredging Co., formerly of St. Louis.

From January to July, 1948, sand was dredged from bars in the Mississippi in the viciniity of the U. S. Engineer Supply Depot on the right bank of the river. The dredge Duplex pumped the hydraulic material a maximum of 9,050 feet through a 25-inch discharge line. Of the total amount pumped, 1,200,000 yards were required to fill in the borrow pits on both sides of the highway embankment. The remaining 300,000 yards in the contract were stockpiled along the bottom of the fill to be used for flattening the sides from a 2 to 1 to a 5 to 1 slope. The clear height of the embankment was also reduced with the filling in of the borrow pits.

(*Continued on page* 44)

Eleven days later, steel is balanced on pier III, and a small guy derrick on the erection platform gets ready to set up the larger 40-ton derrick C. Derrick B is still hard at it on pier IV.

April 1—derrick B has been dropped from pier IV, derrick D works east from pier III, and derrick C is about to make the closure between piers III and IV at panel point 23.

New Bridge Spans Mississippi River

(Continued from preceding page)

south of the other two.

Main Superstructure Contract

The Harris Structural Steel Co. contract covered 3,695 feet of bridge superstructure from the Memphis abutment, high on the east bank of the river, to pier VII on the Arkansas side. It included 12,600 tons of structural steel. The distances of these seven main spans are as follows:

abutment	to pier I	359.280 ft.
pier I	to pier II	790.416 ft.
pier II	to pier III	621.064 ft.
pier III	to pier IV	621.064 ft.
pier IV	to pier V	433.136 ft.
pier V	to pier VI	435.136 ft.
pier VI	to pier VII	434.636 ft.
	Total	3,694.732 ft.

West of pier VII, the remaining 1,523 feet of bridge superstructure was divided into two contracts. The Virginia Bridge Co. of Roanoke, Va., held a $623,168 contract for erecting two deck spans at 172.75 feet and eight girder spans at 87 feet, totaling around 1,042 feet of bridge. The final western section, tying in to the Arkansas abutment, is a concrete trestle 481 feet long. This contract went to the W. L. Sharpe Contracting Co. of Memphis on a low bid of $285,760. The total length of bridge is 5,218 feet.

Piers I, II, III, and IV are in the river; pier IV is at the edge of the bank in Arkansas; while piers V, VI, and VII are on ground subject to overflow during high water. A widening of the river at this point by dredging between piers IV and VII has been discussed. This would provide a greater channel to take the flow in flood times. The present navigation channel is between piers I and II, the 790-foot span, longest of the structure. The Arkansas-Tennessee state line is situated 217 feet west of the center line of pier II.

60-Foot Vertical Clearance

The Harris contract on the main superstructure consists of two simple spans on the western end, and five multiple cantilever spans. The design is Warren-type through trusses with K-type bracing of the bottom and top laterals. The design loading is H-20 for the trusses, and H-20 S-16 for the stringers, floor beams, and hangers. The trusses are 56 feet 6 inches apart on centers, and vary in height from 98 feet at the piers down to 54 feet between the piers. At Memphis, the mean low water and mean high water elevations are respectively 187.3 and 232.9. The low point on the steel is 296.7, thus affording a vertical clearance of 63.8 feet in the channel. The high point of the deck is between piers II and III where the two 0.3 per cent grades meet. Pier III also happens to be the deepest of the piers, being founded at 87.56 elevation.

C. & E. M. Photo
Harris crews weld Carnegie I-Beam-Lok floor on the deck of the new bridge.

All the structural steel was fabricated at the Harris Structural Steel Co. shop at New Market, N. J. Members to be erected from land at the eastern and western ends of the project were shipped by rail all the way to the site. Spur tracks along both banks permitted unloading at the desired locations. Steel for the river spans was shipped from the shop at New Market, N. J., via the Pennsylvania railroad to Tarentum, Pa., on the left bank of the Allegheny River where a 75-ton stiffleg derrick loaded the steel onto barges. It was then floated down the Allegheny, Ohio, and Mississippi Rivers to the Arkansas side of the bridge where it was unloaded by another 75-ton derrick.

For erecting the steel the contractor designed and built four new derricks for the job. Derrick A, the smallest, had a 92-foot boom, a 102-foot mast, and a 20-ton lifting capacity. The other three derricks, B, C, and D, were built alike with 110-foot booms, 120-foot masts, and a lift of 43 tons; the lead line pull was 10 tons. All operated with Clyde three-drum hoists powered by Waukesha gas engines. The distinctive feature of these derricks was the two backlegs extending from the top of mast to anchorages on the top truss chords. The derricks were easily moved, and no guys were required for support. The maximum weight encountered was 47

(Continued on next page)

tons—vertical post members over the piers.

Erection Schedule

Before beginning work on the steel superstructure, the Harris company worked out a comprehensive erection schedule with definite sections of the bridge assigned to each of the four traveling derricks, and also a tentative timetable for each operation. Good planning in the design and erection of this multiple cantilever system required the construction of only two falsework bents in the river.

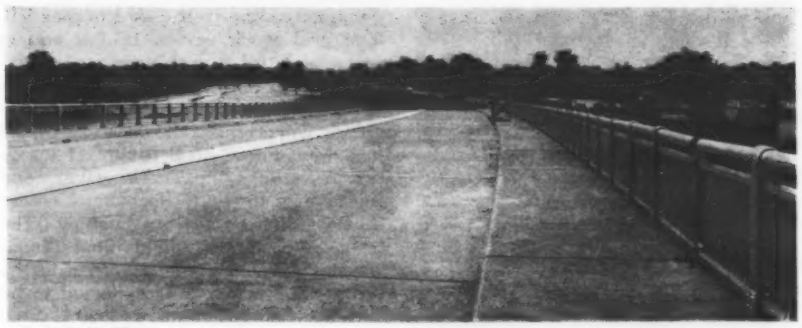
Erection started on the Arkansas side at pier V, back of the river bank, and progressed toward pier IV. A Lima 60-ton crane worked on the ground setting up three temporary erection bents and also the first section of floor. The crane had boom lengths of 60 and 90 feet, and a 15-foot jib extension. When these three erection bents were installed, derrick B was jumped up to the bridge floor level and proceeded erecting steel easterly toward pier IV, moving ahead on its backlegs.

In the meantime, work was moving ahead from pier V to the west end of the contract at pier VII over the two simple spans having 11 chords each. Under each of these 435-foot spans, the crawler crane on the ground set up three temporary erection bents providing a platform with some floor sections to which the 20-ton derrick A was jumped from the ground. At the start the derrick was supported by guys. After the first few panels were in place, the guys were removed and the mast was supported by the two backlegs reaching from the top of the mast back to top chord members. Derrick A worked from pier V to VI to VII, was then dismantled, and moved off the job.

Cantilever Principle

With these two simple spans now in place, derrick B completed the steel erection to pier IV, and continued beyond with this cantilever construction to panel point L (lower) 23, or eleven panels east of pier IV. At this point derrick B was dropped down to a barge and moved over to the Memphis side of the river. For the first overland span out from the east abutment, three temporary erection bents were set up, and derrick B was lifted up to bridge level. It erected steel out to pier I and then continued westerly to panel point L 63, or five panels beyond the pier.

In the meantime, pile bent A, the first of the two falsework river bents, was being constructed at panel point 27, two panels west of pier III. The bents with their platforms were set by lighter from the river. A steel framework or template was set in position to receive the 14-inch H-piles that were driven as a foundation for bent A. Setting and driving was done from two barges equipped with 30-ton stiffleg derrick having 116-foot booms. For this first bent 32 piles, 90 feet long, were driven with a McKiernan-Terry S-5 air hammer powered by two Gardner-Denver air compressors. On top of these supporting piles a steel grillage was placed and the temporary bent was erected. From the bent an erection platform was built back to pier III.



C. & E. M. Photo
You're looking west at the Arkansas approach span of the new Mississippi bridge along the finished concrete deck.

A small guy derrick was installed on this platform for the purpose of setting up the larger 40-ton derrick C. At this point the bridge is too high above the water to permit the assembly of the big derrick in one step. Derrick D, another 40-ton rig, was set up over pier III, and both derricks then worked in opposite directions off the pier, always keeping the steel in balance. A barge was moored between the pier and the bent to carry the hoisting equipment, the lead cables running up to the rigs. The number of panels erected by each derrick was held equal and in balance until a closure was made at panel point L 23, the point reached by derrick B working from pier IV. When the span was closed at that point, derrick C was dropped down to a barge from panel point L 25.

Second River Bent

Derrick D continued to move easterly from pier III, and set steel out as far as panel point L 40, or eleven panels beyond the pier employing the cantilever principle. The temporary river-bent steel was removed from its location at A near pier III, and was set up

(*Concluded on next page*)

New Bridge Spans Mississippi River

(Continued from preceding page)

at B, two panels west of pier II. Bent B was similar to Bent A except that 4 more piles, or a total of 36, were driven at the second river bent. Traveling derricks C and D then began erecting steel out from pier II, in westerly and easterly directions respectively. Derrick C and derrick D balanced the steel carefully on both sides of the pier until C reached L 40, thus closing the span between piers II and III.

Derrick D moving easterly erected steel from pier II as far as panel point 51. This left 12 panels, from L 51 to L 63, remaining in the longest span of the bridge between piers I and II. No falsework was used in bridging the steel over this main channel of the Mississippi. Derrick D cantilevered easterly six more panels, and derrick B, moving westerly from pier I, added six also until a closure was reached at L 57. As the last span was closed, the two derricks were lowered to barges in the river below.

To summarize, the erection of the steel superstructure consisted of three multiple cantilevers from pier I to a point beyond pier II; and on the Memphis side, an anchor arm and a cantilever from the Memphis abutment to beyond pier I. These were then joined with a suspended span over the channel.

As the steel went up, it was pinned and bolted together and jacks were used, when necessary, to obtain the required precise elevations. Riveting followed as quickly as possible, but members in suspended spans were riveted only after such spans were released from any erection supports.

As many as seven riveting crews were employed on the bridge. In general 1-inch rivets were used, with a small amount of ⅞-inch rivets in some of the members. Besides the shop coat, the steel was given two field coats, the last being with aluminum paint.

Steel Grid Floor

To give weight to the short first span on the Memphis side, the anchor arm from the east abutment to pier I, the deck paving is a 7½-inch reinforced-concrete slab. The rest of the bridge deck, however, is a Carnegie I-Beam-Lok floor—a steel grid pattern 4 inches deep, extending from pier I to pier VII. The grid work covers 167,000 square feet and is filled with concrete.

C. & E. M. Photo

Edward L. Guerber (left) directed superstructure work for the Harris Structural Steel Co., and O. F. Sorgenfrei represented Mojeski & Masters, consulting engineers on the job.

The steel floor was welded together using 6 Lincoln electric welding machines. Concrete for the deck was mixed in a MultiFoote 27-E paver set up on the Arkansas side of the river, and raised in a tower to deck level where it was distributed by buggies. The bridge is designed to hold an additional wearing surface if one is needed in the future. The bridge was expected to be open to traffic in January, 1950.

Personnel

The Harris Structural Steel Co. employed a force averaging 100 in the erection of the superstructure under the direction of Edward L. Guerber, Engineer, and Robert Smith, Superintendent. Mojeski & Masters, the consulting engineers, were represented on the Memphis and Arkansas Bridge by O. F. Sorgenfrei, Resident Engineer.

Remember — Safety Is No Accident!

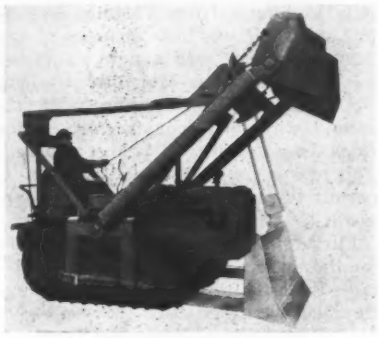
Diesel Motor Graders

A new release, Form 11960, covering road ditching, scarifying, bank shaping, snow plowing, oil mixing, and general road maintenance, has recently been offered by the Caterpillar Tractor Co., of Peoria 8, Ill.

Entitled "Caterpillar Diesel Motor Graders", the 32-page booklet provides illustrations and data on various applications of the company's three models, the 100-hp No. 12, the 70-hp No. 112, and the 50-hp No. 212. Also included are engine cutaway pictures and close-up views of different parts and attachments on these units.

The pamphlet highlights the rear-mounted engine, rigid rear axle, power controls, diesel power, and low-pressure tires, as well as features of advanced design, construction, and improved materials necessary for good motor grading.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 57.



This improved Southwest combination unit can be converted from loader to bulldozer, or vice versa, in approximately 30 minutes.

Combination Loader And Bulldozing Unit

An improved combination loader and bulldozer unit has recently been offered by the Southwest Welding & Mfg. Co., Alhambra, Calif. With one tractor and a minimum number of conversion parts it is possible to change from a bulldozer to a loader, or vice versa, in approximately 30 minutes, according to the manufacturer. The unit is designed for wide applications in construction work.

Southwest cable loader attachments are available for light, medium, and heavy-size tractors manufactured by Allis-Chalmers, Caterpillar, International, and Oliver Cletrac. Struck capacities for the lightweight tractors are ¾ and ⅞ cubic yard; for the medium size, 1 cubic yard; and for the heavy-duty tractors, 1¼ cubic yards. Widths at cutting edges are 48 and 54 inches, 66 inches, and 78 inches respectively. Fifteen inches is added to the cutting-edge width for flared-end type buckets.

Further information may be secured from the company by requesting bulletin CM-11. Or use the Request Card which is bound in at page 16. Circle No. 81.

Hoists and Dump Bodies

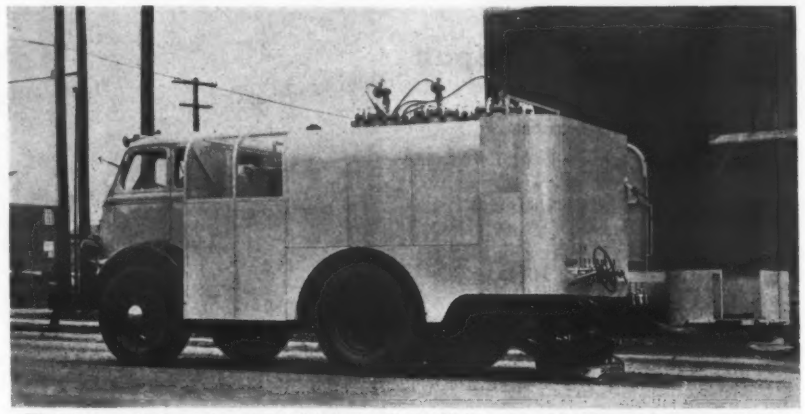
A complete and fully illustrated catalog on truck equipment is offered by the Hercules Steel Products Corp., Galion, Ohio. The booklet illustrates and describes medium and heavy-duty bodies for all makes of trucks and features the Hercules hydraulic hoist for use with dump bodies. Cross-section drawings and cutaway photographs illustrate the component parts and operating features of the hoist mechanism. Specifications are included for both bodies and truck accessories. The catalog explains that the Hercules Center-Lift principle provides a maximum lifting capacity with minimum use of power, and is designed to prevent cramping and to eliminate strain on the body and hinge bolts.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 35.

Additional Data On Striping Units

Following is a correction and additional information about two truck-mounted center-line striping machines announced on page 27 of the December issue of CONTRACTORS AND ENGINEERS MONTHLY. The units were built for the Ohio State Highway Department by the Kelly-Creswell Co., Xenia, Ohio.

These 800-gallon units are mounted on 5-ton Autocar chassis rather than on 3-ton models, as previously stated. Moreover, they are able to apply pre-mixed reflectorized zone-marking material as well as standard zone-marking material. Both trucks are equipped with a bead-dispensing unit especially designed by Prismo Safety Corp. for the application of Lifeline.



This is one of two 800-gallon striping units built for the Ohio State Highway Department by Kelly-Creswell Co. It is mounted on a 5-ton Autocar chassis and can apply standard or pre-mixed reflectorized zone-marking material.

Full information on these striping machines may be obtained from Kelly-Creswell. Or use the Request Card at page 16. Circle No. 87.

Bridge Approaches To New Highway Span

(*Continued from page 39*)

Grading and Paving

In 1949 the original embankment was reconstructed for use as an approach to the new river bridge. The job was done by the Ben M. Hogan Construction Co. of Little Rock, Ark., under a $425,554 contract to the Arkansas Highway Department which included grading and paving of a dual highway. The project started at the St. Francis Levee on the west and continued 2.28 miles easterly to the Arkansas abutment of the new bridge. The net roadway length is 1½ miles because of two existing structures. Work got under way in April, 1949, and was finished by the end of the year.

The two bridges divide the project into three sections. Near the westerly end of the project a 3,500-foot bridge carries the highway over the tracks of the Rock Island Railroad. The other structure, 800 feet long, is both a relief opening for the backwaters of the river, and also carries the road over a spur track off the main line of the Missouri Pacific Railroad. The spur runs into the U. S. Engineer Depot near the east end of the job. The bridge roadways are 40 feet wide, but the opposing traffic lanes are divided by 1-foot precast-concrete white median strip bolted along their center lines. The precast blocks are 8 feet long.

The new pavement is 10-inch reinforced concrete, constructed in two 24-foot lanes which are separated by a 3-foot white concrete median strip. Each roadway has a 4-inch center crown, and the center divider is raised 5 inches above the pavement. Flanking the concrete are 12-foot shoulders built of gravel, with a 4-inch compacted depth and a total pitch of 8 inches. There is no cross traffic, and only limited access to the highway by means of two approach ramps on each side.

Moving the Sand

When the sand hydraulic fill had been pumped along the bottom of the slopes. it assumed the natural angle of repose ranging from 20 to 1 to 30 to 1. Enough material had been deposited at each station to flatten the side slopes 5 to 1 instead of the original 2 to 1 gradient. When the sand had been deposited, it was held in place by dirt retaining dikes which were built up from material dug out of the lowlands. That rich black dirt, with more added to it, was later spread over the new sand slopes to a depth of 1½ feet and then sodded. A row of trees, mostly cottonwood, had been left in place when clearing was done along the toe of slope to check wave wash. The new sand fill had little effect on them, and they were left in place to continue their protection of the new fill.

In moving the sand the contractor worked first along the north bank and then the south bank. Traffic was maintained over the fill during the widening operations even when the old asphalt pavement was being torn up. The grade was lowered somewhat, but a 1-foot cushion of sand was placed over the top of the fill as a foundation for the concrete pavement.

Two methods were used in moving the sand up the slopes from the toe to the sides. In some sections two draglines—a 605 Koehring with a 70-foot boom and a Yaun 2-yard bucket, and a Lima Paymaster with a 35-foot boom and a Hendrix 1-yard bucket—cast the material on the slopes. It was spread in 1-foot lifts by two Caterpillar D7 dozers which also helped in compacting the material. Additional compaction was achieved with rubber-tire rollers.

In other areas the sand was moved by tractor-scraper units. Four of these were used—two Gar Wood 15-yard scrapers pulled by D8's, and two LeTourneau Carryalls, 12 and 10 yards,

C. & E. M. Photo
A Gar Wood 15-yard scraper pulled by a D8 loads embankment fill for the Memphis and Arkansas bridge approaches.

hooked to a D8 and a D7 tractor. Compaction was obtained with the dozers and rubber-tire rollers. Short hauls of only a few hundred feet were necessary. On the longer hauls, when the access roads were being built, three bottom-dump Euclids were placed on the job.

The earth-movers worked two 10-hour shifts; for the night work, six Kohler 15-kw light plants were used to light the site.

Quantities and Personnel

The major items in the grading and paving contract included the following:

Embankment material (sand)	270,000 cu. yds.
Common excavation (black dirt for sand cover)	70,000 cu. yds.
Compacted earthwork	340,000 cu. yds
Reinforced concrete pavement, 10-inch	43,500 sq. yds.
Reinforced concrete pavement, 8-inch (approaches)	3,660 sq. yds.
Reinforcing steel	212,000 lbs.
Gravel (shoulders, etc.)	8,700 cu. yds.
Precast white median strip (bridges	4,304 lin. ft.
Regular 3-foot median strip	7,740 lin. ft.
Mulch sodding	12,000 cu. yds.

The Ben M. Hogan Construction Co. employed an average force of 30 on the project under the supervision of Vernon Clayton, Supt.

The Arkansas Highway Department was represented by Ward Goodman, Liaison Engineer for the Memphis and Arkansas Bridge project. The Department is headed by J. C. Baker, Director of Highways.

At the completion of the new approach, the old truck weigh station near the east abutment of the existing bridge was abandoned, and a new double station was built at the west end of the project.

Tennessee Side

The State of Arkansas participated in the first two projects on the Tennessee side of the new bridge. The remaining work on the eastern approaches was financed by the City of Memphis, the State of Tennessee, and the Federal government. The first contract off the bridge was awarded by the Tennessee Department of Highways to Lehman-Roberts Co., Inc., of Memphis on a low bid of $245,459. This covered 0.374 mile of 4-lane concrete paving on Iowa Avenue from the end of the bridge to Kansas Street.

An adjoining job, done by the W. L. Sharpe Contracting Co. of Memphis for $404,351, makes a connection to Riverside Drive, a scenic route along the Memphis waterfront, via Pennsylvania Avenue. This project was only 0.095 mile in length from Virginia Avenue to Lanham Place, but consisted of two parts. The first was a new underpass for the Arkansas-Memphis Railway Bridge & Terminal Co. line, while the second was the reconstruction of the Rock Island Railroad bridge crossing. This structure required raising to permit the new highway to go underneath.

Further work on the approach called for the extension of Iowa Avenue 0.774 mile from Third Street to Mississippi Boulevard. This contract went to Foster & Creighton Co. of Nashville, Tenn., for $400,383. It included grading, drainage, and a dual 24-foot concrete base, 7 inches thick, topped by 3 inches of sheet asphalt and binder courses. The opposing lanes are separated by a 4-foot median strip, while flanking the pavement are 10-foot-wide parking lanes constructed of concrete 10 inches thick.

The same contractor had another job on the project—building an underpass for the highway to go under seven railroad tracks on a new location 0.512 mile long from Mississippi Boulevard through an intersection with Walnut Street. The $707,524 contract included a four-lane pavement, similar to that described above, and the two-span con-

(*Concluded on next page*)

crete and steel bridge. Each span is 50 feet, and the structure is 114 feet wide, consisting of two concrete abutments and a center pier poured on a gravel foundation. The minimum vertical clearance is 14 feet 6 inches. The superstructure is made up of 40 WF beams, 36½-inch x 280-pounds, on 2½-foot centers.

Other Contracts

Another important structure, coupled with 0.289 mile of dual paving, was awarded to the S & W Construction Co., Inc., of Memphis for $636,675. The bridge is an underpass for the Southern Railway.

Lehman-Roberts Co., Inc., of Memphis obtained another contract for paving Lamar Avenue from East Street to Somerville Street, a distance of 0.302 mile. The $130,897 job is for a dual highway of concrete and asphalt construction.

Another important link in the approach route to the new bridge was the construction of a new concrete and steel viaduct on East Parkway over the Southern railway. This 0.401-mile contract, from Airways Boulevard to Walker Avenue, was handled by J. B. Michael & Co., Inc., of Memphis for $626,445.

All these approach contracts were expected to be completed in time for the opening of the new bridge in January, 1950, unless delayed by tardy delivery of steel.

D. R. Yeary was Resident Engineer for the Tennessee Department of Highways on the eastern approaches to the Memphis and Arkansas Bridge. The Department is headed by S. M. Squires, State Highway Engineer.

Rust Inhibitor Used With De-Icing Salt

Many cities and towns in the snow belt are using salt mixed with the new rust-inhibiting chemical Banox to clear streets and highways for traffic this winter, according to Calgon, Inc., 323 Fourth Ave., Pittsburgh, Pa. Most of the users purchase the salt and Banox separately and do the mixing themselves. But in Kansas one salt firm (Carey) offers a new pre-mixed salt product containing the rust-preventive chemical.

The new chemical, in powder form, is added in small amounts (approximately 1 per cent) to de-icing salt. It was developed originally to rustproof automobiles and other metal products prior to finishing. But efforts of M. L. Davis, Service Director of the city of Akron, led to its new use with de-icing salt. He began the search for a rust-inhibiting additive for salt when motorists bombarded his office with complaints that salt was rusting their automobile fenders. Chemists of Calgon, Inc., suggested Banox, on the hunch that a material for rustproofing autos in the factory should be equally good medicine for autos already on the road. The hunch paid off. Several cities followed Akron's cue and have adopted Banox for the 1949-50 snow season.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 27.

New Trailer Train, A 44-Ton Side-Dump

A new 44-ton side-dump trailer train built by Easton Car & Construction Co. of Easton, Pa., went into service recently at the Oglesby, Ill., quarry of Marquette Cement Mfg. Co. The train is used to haul cement rock on a half-mile round-trip haul between shovel and crusher.

The trailer train combines two large-capacity semi-trailers, coupled by means of a pneumatic-tired dolly. Each trailer of the double-bottomed unit is

This is one of the Easton 44-ton side-dump trailer trains.

equipped with a drop-door side-dump body of 22-ton capacity. The gross weight of the vehicle, loaded, is estimated at 180,000 pounds. Feature of the body design is the patented automatic down-folding side door, which drops open as the body is raised for dumping. When the body is lowered to riding position the door closes automatically. The door-operating mechanism is completely enclosed for protection.

Two hydraulic three-sleeve single-acting telescopic hoists, operated from the driver's cab, raise each body, and each body can be raised separately for dumping. When fully open the side door becomes flush with the floor of the body, providing a chute which sheds the load clear of the wheels. Both trailers are equipped with Bendix-Westinghouse air brakes. Tires on both of the trailers and the dolly are dual 14:00 x 24 x 18-ply lug type. From end to end the tractor-trailer train measures more than 57 feet. The rear trailer and dolly may be uncoupled, and the unit operated as tractor and single semi-trailer. The trailers are interchangeable.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 67.

In constructing a new filtration plant for the City of Burlington, N.C., the V. B. Higgins Co. is making full use of its Bucyrus-Erie 22-B crane. Here the rig handles a concrete bucket on the foundation pour. Equipped with a clamshell bucket, it excavated for the foundation earlier in the job.

Elevating Materials With Inclined Track

An inclined track has been added to the line of hoists and winches made by King Mfg. Corp., 3152 W. Chicago Ave., Chicago 22, Ill. It is designed to simplify the problem of elevating materials to workmen on buildings.

King furnishes the contractor with a platform carrier and reeving pulleys—the contractor builds his own track to desired length, using the parts furnished and regular pine lumber. The construction is simple and 2 x 6-inch lumber can be used as stress is minimized. Blueprints for building are furnished.

The pulley arrangement of the King Incline-Track gives a double line so that the pull at the hoist will not exceed 400 pounds. Any hoist with a single-line pull of 400 pounds or more can therefore be used. The unit can be used to hoist up to 1,000 pounds of material, according to the manufacturer.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 28.

The new King Incline-Track being used in conjunction with a King portable hoist to lift concrete blocks to workmen on a building.

New Device Speeds Rubber-Boot Drying

A unique device designed to reduce the time required to dry the inside of boots has been announced by the Mann Engg. Co., 429 Penn Ave., Pittsburgh 22, Pa. The Boot-Vent offers the added advantage of keeping boots in good shape when not in use; it holds them straight to prevent them from cracking and wrinkling.

Made of light corrosion-resistant aluminum, the Boot-Vent consists of two stiff plates—a leg piece and foot piece—which are hinged together. When the unit is put into the boot, the foot piece slides out into the foot of the boot and the tapered leg piece holds the boot open. Once inserted, the Boot-Vent provides a partition within the boot which permits air circulation. Heat from the sun or any kind of heater will warm the air in front of the partition and set up an air movement which greatly accelerates the drying process. The Boot-Vent comes in pairs and is designed for use in all boots, sizes 8 to 12 inclusive.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 122.

The Earthworm boring machine installs pipe up to 3 inches in size for conducting cable, wiring, or water under streets or roads.

Earth-Boring Unit Places 3-Inch Pipe

The Earthworm boring machine is a new unit especially designed for installing pipe up to 3 inches in size for conducting cables, wiring, or water under streets or roads. The principle of the machine is the same as that used in oil-well drilling except that the Earthworm is designed to operate in an approximately horizontal direction. It is manufactured by the Lube Jack Co., 1415 Fourteenth St., Santa Monica, Calif.

The Earthworm track is set for the direction and level of grade desired and a bit of the proper size is attached firmly to the first length of drill stem. Water is turned on by the service cock of the machine and boring is started by placing the clutch lever in the forward position and pushing the manual feed lever forward. Additional lengths of pipe are added and the boring continues for the desired length of drill.

The three models available—15, 25, and 40—differ in their gasoline engines: a 1.2-hp Lauson, a 2.3-hp Lauson and a 4-hp Wisconsin, respectively. The parallel reversible track is 49 x 13 inches overall. The constant-mesh gears provide a 9 to 1 ratio in forward speed. Three different bits may be used for handling different soil conditions.

Features of the Earthworm include its ability to stay on line, its sensitivity to "feeling" intersecting pipe-line obstructions, and its application to underroad work where traffic is not to be detoured.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 56.

Suggested Plant Layouts For Crushing and Screening

An interesting engineering brochure which contains drawings and suggestions for arranging equipment to make up complete portable and semi-portable crushing and screening plants has been issued by the Crusher Division of Nordberg Mfg. Co., 3073 S. Chase St., Milwaukee 7, Wis. Flow sheets and tables show arrangements, horsepower requirements, and conveyor, screen, and crusher specifications for various hourly capacities.

As far as the arrangement of the equipment is concerned, the quarry or gravel-pit site and the feed from either will govern, to a great extent, the type of crushing or processing units to use. The arrangements shown and the specifications given are for average conditions, but the character of the material to be fed to the plant and the desired capacity in finished material will determine the actual equipment.

All of the suggestions indicated on the drawings consider the weight, width, and length limitations required for highway transportation. The plant capacities are given for rock and gravel feeds containing a nominal amount of fines as quarried.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 58.

Hopper Truck Body

A new 35-cubic-yard hopper type of truck body for material hauling has been designed by Marion Metal Products Co., of Marion, Ohio. Its inside dimensions are 26 feet x 90 inches. The air-operated hopper doors are 8 feet long and 3 feet wide, and are unlatched and closed by controls in the truck cab.

Complete body specifications and details may be obtained by writing to the company, or by using the Request Card at page 16. Circle No. 15.

Equipment Lights

A full line of lights for highway vehicles and equipment is offered by the K-D Lamp Co., 1910 Elm St., Cincinnati 10, Ohio. These lights are designed for use by highway departments and contractors in identifying special or emergency road equipment, snow plows, wreckers, etc.

Included in the line are the KD C867, a one-way 6-inch-diameter light; the KD 254 Dualite, a two-way 7-inch-diameter light; the KD 868, a two-way light with a 5-inch lens; and the KD 864, a 7-inch-diameter snow-plow light. These lights may be obtained with suitable colored lenses to conform to all state requirements. The KD C867 and KD 254 can be made to flash if desired.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 53.

Protective Masks

Protective masks consisting of a plastic shield, held in position by an adjustable elastic headband, and replaceable laminated filters of extra thickness are now offered by the General Scientific Equipment Co., 2700 W. Huntingdon St., Philadelphia 32, Pa. They are designed to protect throat, nose, and bronchial tubes from larger particles of non-toxic dusts that irritate these membranes. The masks weigh less than ½ ounce.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 90.

Capacity of this Marion hopper type of truck body is 35 cubic yards. Its inside dimensions are 26 feet x 90 inches.

Research Board Holds 29th Annual Meeting

Highway Engineers Present Variety of Papers Based On Research Work; Award To One on Pavement Design

✦ THE Highway Research Board held its 29th annual meeting from December 13-16 at the National Academy of Science in Washington, D. C. Nearly 750 engineers and scientists registered for the four-day gathering at which some 70 papers on highway research were presented. The papers dealt with highway topics in the field of economics, finance, administration, design, materials, construction, maintenance, equipment, traffic, operations, and soils.

The annual award that the Board makes for a paper of outstanding merit given at the last meeting went to two engineers of the California Division of Highways—F. N. Hveem and R. M. Carmany. At the 28th annual meeting in 1948 they submitted a work entitled "The Factors Underlying the Rational Design of Pavements".

This award-winning paper presents a discussion of the pavement design problem, dividing it into four parts: 1-A. Analysis of the pavement design problem, identifying the essential properties of traffic, pavement, and foundation soils, which must be evaluated to accomplish a comprehensive design. 1-B. Behavior patterns developed in masses of granular materials under load, illustrating the flow patterns developed by sands or clay materials under load. 2. Mathematical relationships between magnitude of load, area of contact, load repetition and strength of pavement, and resistance value of soil. 3. Testing of soils and bituminous mixtures; preparation of test specimens. 4. Design procedure, describing the procedures followed in designing pavement base and surface courses.

Board Honors Engineers

The Distinguished Service Award, established by the Highway Research Board for outstanding achievement in the field of highway research, was presented to O. K. Normann of the Bureau of Public Roads, and Kenneth B. Woods, Professor of Highway Engineering at Purdue University.

For the past 14 years O. K. Normann has been engaged in research relating to the use and operation of highways. Now Chief of the Section of Traffic Operations, he has been responsible for the analysis of research data pertaining to traffic operation studies conducted by the Bureau of Public Roads. He has had a large share in the development of special electro-mechanical equipment necessary for these studies. Through his pioneering work in a practically new field, much of the traffic data needed for effective design of highways have been gathered, analyzed, and put to use.

Professor Woods is an Associate Director of the Indiana Joint Highway Research Project, a cooperative project between Purdue University and the State Highway Commission of Indiana. He has also contributed many papers to technical literature on highway matters.

Guest Speaker

At one of the general meetings, the gathering was addressed by guest speaker General J. A. Anderson, First Vice President, American Association of State Highway Officials, and Commissioner of the Virginia Department of Highways. General Anderson told the group that the highway departments of the country looked to the Highway Research Board for guidance, and wished to be kept informed of its findings. He noted that this country has always been involved in improving its communications except during time of war, and cited Washington, Jefferson, and Chief Justice Marshall as early leaders in this work.

The General stated that the highway problem is an overall problem, including the urban throughway as well as the capillary road carrying only a few vehicles a week. He recommended greater interest in this latter type of highway, and warned that the "have-nots" on the capillary roads will retard state highway programs unless they are looked after. General Anderson also emphasized that highway departments must earn, deserve, and have public support.

Wide Subject Variety

The many papers that were presented covered a wide variety of subjects in the highway research field. Some dealt with new developments in the standard subjects that are usually discussed at every annual meeting. Others pioneered in research involving new methods and approaches to highway design and construction progress. A well knit paper in the latter category was presented by George W. Lamb, American Institute of Steel Construction, and E. S. Elcock, State Highway Commission of Kansas, entitled "Report on the Design and Construction of an All-Welded Plate Girder Highway Bridge in Kansas".

This paper outlined the design and construction of an all-welded deck-plate-girder highway bridge having spans of 84-108-108-84 feet. It was designed in competition with other designs using WF beams and riveted plate girders. Estimated weights showed a saving in metal of 18 per cent over the riveted plate girder, and 24 per cent over the WF beams designed for stress alone. Savings over a WF beam design which met stringent specifications limiting live-load deflection to 1/800 of the span were 54 per cent.

The design procedure, omitting the stress analysis, was described, as well as the welding and erection methods. The need for more complete design specifications for welded bridge structures was suggested.

Rubber Roads

Another paper of merit on a modern trend, entitled "Field Experiments With Powdered Rubber in Bituminous Road Construction", was presented by Tilton E. Shelburne and R. L. Sheppe of the Virginia Department of Highways. This report described the construction of three field experiments with powdered rubber. In Section 1 powdered natural

(*Concluded on next page*)

rubber was incorporated in the bituminous-concrete sand-asphalt wearing surface. Section 2 was a similar surface to which reclaimed powdered rubber was added. The third section was a seal treatment with cut-back asphalt (RC-2) to which natural powdered rubber was added and mixed in the distributor prior to application. Identical sections without rubber were constructed adjacent to the experimental ones for purposes of comparison.

Skid tests were conducted in which the resistance of the surface to skidding was determined by the stopping-distance method. Tentative conclusions of the report indicated that skidding is lessened when a small amount of natural rubber is incorporated in the plant-mix surface course. There was no indication that the reclaimed rubber had been effective in improving skid resistance. Only a slight difference was noted in the stopping distances on a seal treatment with and without the addition of natural rubber.

Conclusions were not drawn at this early date regarding improvement in durability characteristics. The authors suggested that in order for such mixtures to be generally accepted, they must not only show improved performance but also prove economical to the user. They also recommended that comprehensive laboratory research be conducted to determine the fundamental properties of rubber-asphalt mixtures.

Subsurface Exploration

R. W. Moore of the Bureau of Public Roads prepared a paper on the "Development of Geophysical Methods of Subsurface Exploration in the Field of Highway Construction". According to the findings, earth resistivity and refraction seismic tests were found to be the most adaptable to road construction problems. Portable seismic equipment was designed and built, and suitable earth-resistivity apparatus constructed since 1933 by the Physical Research Branch of the BPR.

Subsequent work carried on during the past 14 years has served to establish fully both methods of test as useful, rapid, and economical means for obtaining preliminary information regarding the subsurface formations encountered on a given road location. Demonstrations to state highway departments and several Federal agencies have been made in more than 20 states.

It is the practice of the Bureau of Public Roads to use the resistivity test initially when making a detailed subsurface survey, and then follow up with a few seismic tests at those locations where field conditions limit the usefulness of the resistivity test.

This relatively simple method of exploring the subsurface has been used in some degree in the road construction program of states in obtaining useful information concerning foundation conditions for structures, classification of excavation materials, and the location of sand, gravel, and quarry material. Several other states have recently expressed an active interest in the possible use of such methods in their subsurface exploration work.

Roadside Development

Under the Design Section several committee meetings were held on the subject of roadside development, with progress reports on stabilized turf shoulders, seeding and mulching, and wayside and turnout areas.

Last year the Roadside Development Committee initiated a five-year program of study and research, with the objective of completing in 1952 a comprehensive report on all phases of roadside development. A large part of the committee meetings this time was given over to a general discussion of grading and drainage, the problems involved, and specific requirements for further study and additional research on these subjects.

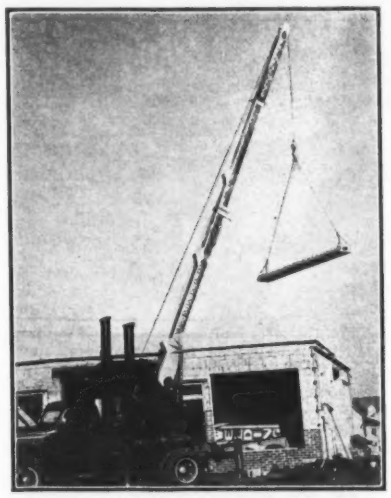
One of the problems which in some areas has become acute is the effect of changes in land use on highway drainage. In many instances, the original drainage installations, adequate at the time the road was built, no longer are so because the adjacent area has changed in character. During this discussion, a new approach to the problem of highway drainage was brought out. Up to now, the highway engineer's aim has been to remove water from the highway as rapidly as possible. In view of the increasing water shortage in this country, it was suggested that the highway engineer can make a great contribution by broadening the concept of his responsibility in the matter of drainage. While in the interest of safety it is essential to remove water from the traveled way, more thought should be given to ways and means of retarding the flow thereafter and of retaining water in the adjacent land, instead of losing it by sending it to streams and on its way to the ocean.

Election of Officers

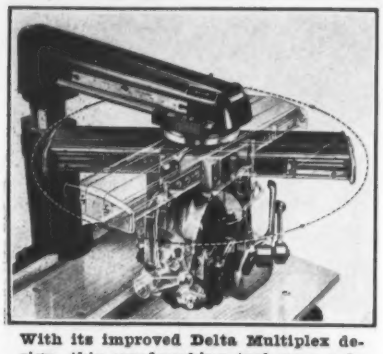
During the meeting, the following changes in officers and members of the Executive Committee were made. Professor R. A. Moyer, Research Engineer at the Institute of Transportation and Traffic Engineering, University of California, was elected chairman of the Executive Committee for 1950—he was formerly Vice Chairman.

R. A. Baldock, State Highway Engineer, Oregon State Highway Commission, was re-elected to serve his second 3-year term on the Executive Committee, and was elected Vice Chairman of that committee for 1950. W. H. Root, Engineer of Maintenance for the Iowa State Highway Commission, and H. P. Bigler, Executive Vice President of the Connors Steel Co., Birmingham, Ala., were also elected to the Executive Committee for three years.

Retiring members of the Committee are Professor R. L. Morrison of the University of Michigan, and Stanton Walker of the National Sand & Gravel and Ready-Mix Concrete Associations.



A Bucyrus-Erie H-3 Hydrocrane places preformed concrete slabs during a building-construction job in West Allis, Wis. Owned by Cities Fuel & Supply Co. of Milwaukee, this Hydrocrane is mounted on an International truck. Note the hydraulically set outriggers.



With its improved Delta Multiplex design, this woodworking tool uses only two instead of the usual three circular movements found in similar machines.

Woodworking Machine Is of Improved Design

An improved Delta Multiplex engineering design, which utilizes only two instead of the usual three circular movements found in radial-type woodworking machines, has been announced by the Power Tool Division of the Rockwell Mfg. Co., 600 E. Vienna Ave., Milwaukee, Wis. With the use of different attachments, this machine offers over 125 woodworking applications.

The double radial action of this saw occurs at a center pivot position above the saw table. It is claimed that with the Delta Multiplex it is possible to locate the motor power unit at any position—even vertically—above the working table. Any kind of rotary cutting tool can be quickly attached to the motor spindle, according to the manufacturer.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 77.

Cold-Weather Work With Oil Salamander

An oil-burning salamander for winter construction is available from C. R. Daniels, Inc., Daniels, Md. The company says that tests on the Danco salamander demonstrated that with an outside temperature of zero it will maintain a temperature of 40 degrees F in a space of 45,000 cubic feet, enclosed on four sides with canvas walls. This temperature is maintained with a fuel consumption of approximately 1⅔ gallons per hour. The salamanders are said to be solidly constructed, easy to assemble, and simple to operate. Hot-rolled galvanized construction eliminates chipping and flaking. A convenient removable hood is used when the ceiling is low and the heat must be diffused.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 68.

Asphalt Institute Elects

Bernard E. Gray was elected President of the Asphalt Institute at the annual meeting of its Board of Directors in New York City. Inghram Grayson, manager of Asphalt Sales for Lion Oil Co., was elected Chairman of the Executive Committee. Other members of this committee are N. H. Angell, Stancal Asphalt and Bitumuls Co.; J. N. Byrd, Mexican Petroleum Corp.; P. C. Doyle, Standard Oil Co., (Ohio); H. B. Pullar, Berry Asphalt Co.; R. S. Ketcham, Col-Tex Refining Co.; Harold R. Pauley, The Petrol Corp., and Bernard Gray.

The five divisional Vice Presidents chosen are: J. N. Byrd for the Atlantic-Gulf; P. C. Doyle, Ohio-Great Lakes; H. B. Pullar, Midwest; R. S. Ketcham, Southwest; and Harold R. Pauley, Pacific Coast.

Herbert Spencer was re-elected Secretary of the Institute; George R. Christie, Socony-Vacuum Oil Co., Inc., was re-elected Treasurer; and John N. Smith, also of Socony-Vacuum Oil Co., Inc., Assistant Treasurer.

Bernard E. Gray, the new President, is widely known throughout the highway field, having been associated with construction and maintenance for nearly 40 years. He was Engineer-Economist with the U. S. Bureau of Public Roads and Senior Highway Engineer in charge of some of the first Federal-Aid projects. Before joining the Asphalt Institute in 1930 he was State Maintenance Engineer in West Virginia.

Catalog on Drill Jibs

A bulletin on the Hydro Drill Jib is now offered by the Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa. The jib is a mounting to carry standard rock drills on either regular drill feeds or on long chain feeds. It operates hydraulically and is designed to raise and lower the drill with a minimum of effort and time. In addition to tunneling and cut-and-fill work, drilling holes for highway undersealing is described in the catalog.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 97.

Contractor Flies To Scattered Jobs

A Ryan Navion airplane now bears the blue paint and M-H decal of McKoy Helgerson, South Carolina construction company. H. B. McKoy, business half of the partnership, is usually tied to his desk in the Greenville office. But partner H. C. Helgerson, the company's "jam-up" engineer and trouble-shooter, uses the 155-mph Navion to reach the scene of machinery breakdowns fast and get things moving again.

Hospital construction in South Carolina, textile-plant building in North Carolina, and sewage-system installation in Kentucky are typical M-H jobs that are carried on simultaneously. In addition to speeding supervision of these scattered projects, the Navion comes in handy for pre-construction surveys, such as determining the amount of cut or fill that will be necessary, and for aerial estimating of bids.

There's often no substitute for a personal visit to the job, believes the McKoy Helgerson Construction Co. of South Carolina, and no speedier way of visiting than by plane. That's McKoy on the left, Helgerson on the right, and Bob Parks in the cockpit of their Ryan Navion plane. The Municipal Airport tower, in the background at Greenville, S. C., was built by this firm.

Small-Size Hoist

A hoist with a normal lifting capacity of 500 pounds and a hoisting speed of 100 fpm is manufactured by McGee & Hogan Machine Works, 1154 S. 2nd W., Salt Lake City, Utah. This small-size material hoist may be powered by a 1½-hp single-phase 110/220-volt electric motor or by a 4-hp air-cooled gasoline engine. It has a mast height of 6 feet, a 360-degree boom traverse, and carries 75 feet of 5/16-inch preformed wire rope.

The M & H Builder's Hoist features all-steel cut-tooth gears, a single operating handle for both clutch and brake, a positive brake with replaceable lining, and a hand crank for use in the event of power failure. The three main components of the hoist—motor, boom and hoist assembly, and mast and base assembly—are easily disassembled for moving from one place to another.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 69.

Two Diesel Engines Have 175-Hp Rating

Two new 6-cylinder high-speed diesel engines for on-highway and off-highway automotive applications have been placed in production by Cummins Engine Co., Inc., Columbus, Ind. Both the HRBB-600 (highway) and HRBBI-600 (off-highway) have a maximum rating of 175 hp at 2,000 rpm.

They feature a fully counterbalanced crankshaft, a camshaft of new design, a viscous-type torsional vibration damper, and a revised fuel pump. They have a piston displacement of 743 cubic inches, a 5⅛-inch bore, and a 6-inch stroke.

Both models are supplied with the following standard items: an air cleaner of the oil-bath type; 12/24-volt 700-watt electrical equipment; an SAE No. 2 flywheel housing with SAE No. 3 arms; a Cummins fuel pump; fuel-oil filter; fuel-oil pressure gage; lubricating-oil pressure gage and strainer; and thermostats with main and by-pass flow control. Additional standard equipment includes a 2-cylinder 7¼-cubic-foot air compressor and a flywheel for a 13-inch two-plate Lipe clutch on the HRBB-600; and an idling control and flywheel for a multiple-disk clutch on the HRBBI-600.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 41.

Chain-and-Sprocket Gives Four-Wheel Drive

Chain - and - sprocket four - wheel drive is an exclusive feature of the six-wheelers manufactured by The Tructor Corp., 156 Wilson Ave., Newark 5, N. J., according to the company's new 4-page folder. The special drive, it is pointed out, is intended solely as an emergency device for temporary use when road surfaces are icy or otherwise detrimental to adequate traction. The principles of design, the methods of installation, and features of the chain-and-sprocket four-wheel drive are explained in the catalog.

This literature may be obtained from the company, or use the Request Card at page 16. Circle No. 107.

This Grace fiber-bristle drag broom is designed for leveling cover stone on seal-coat work.

Leveling Drag Broom

A fiber-bristle drag broom for leveling cover stone on seal-coat work is offered by W. E. Grace Mfg. Co., Dallas 15, Texas. Its construction is similar to that of a fiber push broom except that the sections are 8 and 10 feet in length. It is designed to provide even brooming, with no ridges.

Its dimensions set up are 8 x 12 feet. Two angle-type hitch bars hold the assembly together. The broom may be easily knocked down for transporting.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 70.

New Lubricant Pump

A new Centro-Matic electrically operated drum pump has been announced by Lincoln Engg. Co., 5702-24 Natural Bridge Ave., St. Louis 20, Mo. Model 1837 is designed for fast, positive delivery of heavy, viscous, or fluid lubricants. It is for use with original 55-gallon barrels or 400-pound drums, in conjunction with Lincoln centralized single-line lubrication systems.

These fully automatic drum pumps are intended for use where compressed air is not available, or where electrically powered and controlled equipment is preferred. Standard equipment includes a control panel with a time clock adjustable for time-frequency settings, a pressure switch, and a signal alarm. The panel can be mounted in any location desired. A flanged steel drum cover fits over the top of center-opening or full-open drums, provides mounting support for the pump, and protects lubricants from contamination.

A standard 1-hp electric motor furnishes motive power for the pump, which is gear-driven. A built-in pressure relief valve vents excess lubricant pressure from the lubricant supply line following discharge of the injectors in the system.

Further information may be obtained by requesting Bulletin 800-1 from the company. Or use the Request Card at page 16. Circle No. 12.

For Pavement Protection

A folder describing Jennite J16, a pavement surface seal coat that is said to prevent the damaging action of gasoline and oil, and the freezing and thawing action of penetrated surface moisture, is offered by Maintenance, Inc., Wooster, Ohio. The catalog describes Jennite's features and applications. It points out that the seal coat is applied at the rate of from 1½ to 2 gallons per 100 square feet, by squeegee, surface brush, or spray. The surface, the bulletin adds, may be dry or wet with water, but it should be free of puddles.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 108.

Heads Drill-Steel Division

Robert W. Persons is now Product Sales Manager of the Drill Steel Division of Crucible Steel Co. of America, New York City. Before he came to Crucible in 1930, he had been with the George J. Atwell Foundation Corp. and Ingersoll-Rand Co. The division he now heads was created last fall to direct Crucible's national activities in drill steels and allied lines.

Highway Restrictions For Trucks and Trailers

The 1950 issue of "Truck and Trailer Size and Weight Restrictions" is now available from the Sales Promotion Department of The Four Wheel Drive Auto Co., Clintonville, Wis. This pocket-size publication, originated by the company in 1933, lists all laws affecting the size and weight of trucks, trailers, and truck-trailer combinations, for every state of the Union and the District of Columbia.

The booklet tells the truck operator what new laws will affect his truck and its load upon crossing any state border. Permissible axle loads, length of trailers, overall lengths, number of trailing units, total gross loads, and all other laws affecting truck operations are covered. The 1950 booklet has been brought up to date as of November 1, 1949. A thorough research of every state was made in order that any recent changes in laws made by the last legislatures would be included.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 34.

Julius P. Heil Dies

Julius P. Heil, founder and Chairman of the Board of The Heil Co., Milwaukee, Wis., died recently of a heart attack.

Mr. Heil started his company in 1901 with savings of $550 and three employees. Early products of the company included welded truck bodies and storage and transport tanks. In 1924 the production of oil-fired heating units and water systems was initiated. A continuous diversification of the product line led to the manufacture of bulldozers and scrapers for the construction industry in 1936.

Mr. Heil was very active in Wisconsin political and social life. As Governor of Wisconsin he introduced the "Wisconsin—America's Dairyland" slogan. In 1945 he was awarded an honorary Doctor's Degree by Northland College at Ashland, Wis., in recognition of his humanitarian activities and his service to his state.

Blower Provides Heat For Cold-Weather Work

Literature describing the Behlen heat blower, a skid-mounted unit designed to provide up to 1,200,000 Btu of direct heat per hour, may be obtained from the Behlen Mfg. Co., of Columbus, Nebr. Applications for this heater include warming aggregates at the batching plant, controlling temperatures for concrete curing, pre-heating engines, and similar wintertime work.

Specifications given by Behlen indicate that the forced-draft heat blower has automatic temperature control, pilot-light burner, temperature indicator, spark-arresting Monel air-filter screen (optional), 16-gallon mounted fuel tank, and a 7-foot-long 15-inch-square output pipe. The unit uses kerosene or a No. 1 distillate.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 48.

Catalog Covering Air And Hydraulic Cylinders

A 32-page catalog containing complete engineering data on air and hydraulic cylinders for operating pressures up to 1,500 psi, is being offered by the Hydro-Line Mfg. Co., 711 Nineteenth St., Rockford, Ill. The booklet is designed to assist the engineer in selecting and specifying the size and type of cylinders best suited for a particular job. It contains basic cylinder information with simplified tabulations of dimensions so that proper cylinders can be found with a minimum of time and effort.

Tables for the Hydro-Line standard high-pressure hydraulic cylinders are separated according to the eight types of standard mountings. A cross-section diagram and accompanying tables indicate all construction features of the Hydro-Line cylinders. Similar tables are presented for the air and low-pressure hydraulic cylinders. Charts record the relationship between area, volume, and velocity of cylinders so that when any two are known the third may be determined. A displacement and force chart is included for both the high-pressure and the low-pressure cylinders.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 114.

Airco Promotes Berryman

Air Reduction Sales Co., of New York City, has appointed J. H. Berryman Assistant to the Manager of its Technical Sales Division. He will be responsible for the technical promotion and sale of equipment for the Aircomatic welding process. Mr. Berryman joined Airco in 1946 and served in the Technical Sales Division as Machine Welding Specialist and Assistant Metallurgical Engineer until his recent promotion.

Gold Dredge Strips Canyon Ferry Dam Site

Missouri River Dam Site Cleaned Under Water by Dredge Prior to the Actual Diversion of River

By RAYMOND P. DAY,
Western Editor

✦ HIGH in the headwaters of the Missouri River near its source, a gold dredge has been uncovering the Canyon Ferry dam site before the river was diverted. When final closure was made, and the stream was by-passed through a 22,000-cfs wood and steel flume, the unusual dredging stunt already had removed 250,000 cubic yards of overburden from the 1,000-foot-long site.

The dredging scheme will also perform some other vital construction features, including the production of all of the concrete aggregate from an underwater deposit in the river.

Perry & Schroeder Mining Co., owner of the big 6-foot Yuba gold dredge, has subcontracted much subaqueous work from Canyon Constructors, prime contractor on the $11,896,425 multiple-purpose project for the Billings Office of the U. S. Bureau of Reclamation. Canyon Constructors is composed of J. C. Maguire Co. and Griffith Co. of Los Angeles; Wunderlich Contracting Co. of Jefferson City, Mo.; and Brown & Root, Inc., of Houston, Texas. J. C. Maguire Co. is the sponsoring contractor.

Purpose of Dredging

Several construction conditions exist at Canyon Ferry Dam which make the use of gold-dredging equipment especially well suited to this unusual departure from usual construction practices. First of all, the stream diversion job was unusually large for a dam the size of Canyon Ferry. The Missouri River at the dam site is 350 feet wide and flows up to 32,000 cfs have been recorded.

The dam site is in a narrow gorge, where the only practical way of stream diversion is through a flume. A timber and steel flume was designed with a capacity of 22,000 cfs. It also has a safety outlet because there is a 1 in 5 chance that a flood will put in more than it can carry. Thus it is vital that the period during which the stream flows through the flume be made as short as possible.

That is where the gold dredge came in. Working from the river surface before stream diversion was attempted, the powerful bucket-line machine took out 250,000 cubic yards of material. Part of this material it handled only once to accomplish two results: performing stripping excavation while constructing a cofferdam backfill at the same time. When the stream started through the diversion flume, the river bottom was ready for beginning the bedrock excavation to key in the foundation of the concrete structure.

The dredge has also been doing a useful piece of work in connection with the construction of cofferdams. Both the upstream and downstream cofferdams are composed of AP-type steel sheet piles, driven to bedrock and backfilled to the top of the piles with river overburden. The Missouri River at the dam site is a green, clear mountain stream, and its bed is mostly large boulders and gravel. It is an entirely different stream than it is farther on down past the main-stem dams like Garrison and Fort Randall, under construction by the Corps of Engineers.

The presence of so many large boulders made it impossible to drive the long sheet piles, so the dredge was used to excavate a trench to bedrock along the line of both cofferdams. At the same time it put back a few of the fines, enough to permit the piles to be set. The dredge then did the backfilling with its stacker, after the piles were driven by a barge-mounted crane, so the cofferdam would have a water-tight steel diaphragm.

In this work, the dredge left an exit channel through the upstream cofferdam, and helped bulldozers and any other equipment which was assigned to make the final closure.

The dredge in addition will go upstream and recover the concrete aggregate from underwater deposits. Altogether it will move about 1,000,000 cubic yards under this contract.

C. & E. M. Photo
Here is the 51-year-old Canyon Ferry Dam and powerhouse—to be inundated by the new reservoir. Canyon Constructors is the prime contractor on the project.

Gold Equipment By-Passed

The Pan-American Engineering placer jigs, over which have passed more than $1,800,000 worth of gold and a fortune in sapphires and other precious

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C. & E. M. Photos

Perry & Schroeder's gold dredge looms large on the Missouri River as it uncovers the Canyon Ferry dam site (left). The photo above was taken looking through the forward gantry toward the right abutment of the dam.

jewels since the rig was new late in 1938, have been blocked off for the dam dredging operation. When the dredge is digging gold it ordinarily uses 16 jigs in the rougher circuit, and 2 in the cleaner circuit just ahead of amalgamation. There is gold at Canyon Ferry, but it is not being recovered because that would slow down the excavation at a time when high production is necessary.

The Yuba dredge has a 50 x 100 demountable steel pontoon hull, two 55-foot steel stern spuds, a 110-foot stacker boom with a 30-inch belt conveyor, and a 100-ton bucket line and ladder, which is carried by cables from a heavy forward gantry. Power is all electric. A power cable brings electricity in to the rig at 4,000 volts, and a transformer bank aboard the dredge steps it down to 440 volts for use. The digging motor is 125 hp, with 30-hp motors on trommel screen, stacker, and winches.

The heavy digging machinery consists of an endless bucket line which will dig about 48 feet below the water surface, and produce about 350 cubic yards an hour. The bucket line, made by Columbia Steel Casting Co. of Portland, Oreg., has already dug 12,000,000 cubic yards and still has many cubic yards of useful life. Its 94 heavy manganese buckets, rated at 6 cubic feet, actually hold 6½ cubic feet, after they have been built up with special lips. The line is dumping 29 units per minute, with a bucket factor very close to 100 per cent and a digging efficiency approximately 85 per cent. The dredge is working two 8-hour shifts.

The route of material starts with the bucket line, which dumps the gravel and rock into a receiving hopper. The water jet normally used to sluice out the buckets in gold-recovery work has been disconnected, because the gravel will dump clean.

The material then passes into a 45-foot trommel screen 6 feet in diameter. Here too the normal high-pressure water jet which washes the sand down through the screen has been shut off, and part of the screening area blocked. The material passes down to the low end of the trommel and on to the 110-foot stacker conveyor. The only material running across the placer jigs is a little muddy water with a very little bit of fine sand, which escapes through the trommel screen.

The abnormally large volume of solids passing through the trommel screen quite naturally puts a heavy load on the driving motor. It also presents somewhat of a stacker problem. Normally the stacker runs at about 220 fpm, and its slope is not too sharp. Here the stacker had to be raised to an angle of 20 degrees, and the belt speeded up to 460 fpm. But the belt is taking the material successfully, without rolling and running back.

Unusual Digging Scheme

When a gold dredge digs as it usually does, its empty buckets make a deep arc down under the dredge, and the buckets fill as they rise up at the toe

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Gold Dredge Strips Canyon Ferry Dam Site

(*Continued from preceding page*)

of the gravel bank. On the excavation of the cofferdam trenches the scheme is considerably different. The dredge is digging the trench by "chopping" down under the hull.

In order to stack the coffedam excavation upstream of the cofferdam limits, the dredge is spotted at right angles to the cofferdam line. A winch cable is run from the forward and stern ends to deadmen on each shore. Starting on the right bank of the stream, the dredge is working by lowering its bucket line gradually, until the buckets go down to the depth of solid rock.

When solid rock is reached on that cut, the dredge then moves over by raising its digging spud and taking up on two cables. Normally the machine digs like a suction dredge, hanging on one spud and swinging its front end. Here it uses its digging spud, but only to anchor the machine and give it stability while working against the bank.

The first overburden stripping was done on the dam site. The stacker boom discharged to a haul road on shore, where loading and hauling equipment of Canyon Constructors could reach the spoiled material. Some of the construction stiffs, unused in the way of gold dredges, were a little inclined to scoff at the trickle of material off the stacker boom. When that trickle turned into a pile which snowed a 2½-yard shovel under, they soon changed their opinion.

The dredge re-handled very little of the material, because the dimensions of the excavation are such that the 250-foot distance from the bucket-line point to the end of the stacker permitted material to be dumped outside the pay area. The only re-handling is being done by power shovels and trucks, which take some of the material away. So far the dredge is averaging 350 cubic yards an hour, with no bad breakdowns.

Abutments Stripped

Meanwhile, Canyon Constructors was busy last construction season principally with excavation. The dam abutments were stripped, and a path for the tail-tower track which will handle mass concrete later on was roughed in. Excavation is practically all in solid rock, much of it hard.

The steep rocky gorge at the Canyon Ferry dam site is composed principally of hornfels metamorphosed by a nearby granitic intrusion. Hornfels is a more or less general term applied to silicified limestones. The heat of the intrusion has burnt the limestone, driving off the CO_2, just as happens in a lime kiln, and leaving a quick lime which then combines readily with the hot solutions of silica or quartz from the granitic intrusion. This results in a fine-grained and usually very hard and tough rock. It may be massive, banded, or foliated, depending on the type of limestone or limey shale it came from, and so often has a high degree of cleavage.

Both abutments were stripped from the top toward the bottom. The left abutment was stripped by angle-blade dozers, drilling equipment, and a high-pressure water jet. The right abutment was stripped in much the same way, except that the water jet did more of the work there.

Since the rock was so hard, special drill bits had to be used. Timken Carboloy bits and Throwaway bits were used with good success.

Drilling equipment, in addition to pneumatic hand-held drills, consisted of 6 Gardner-Denver drifters mounted on Ingersoll-Rand frames. Compressors included a 500-cfm and a 200-cfm Gardner-Denver machine, a Joy 315, and an Ingersoll-Rand 500. Two 8-inch water pumps were used to force Missouri River water through an 8-inch header pipe up to where hydraulic nozzles and hose could strip off the loose rock and dirt.

Loading equipment included a Marion 1½-yard shovel, a Northwest 80-D, and a Bucyrus-Erie 54-B. Hauling equipment was all Euclid: 6 end-dumps and 6 bottom-dumps. There was a No. 12 Caterpillar motor grader to maintain the haul roads, and 4 D8's with Caterpillar dozers for stripping and other bulldozing work. A D7 with a dozer and rear-end winch, as well as a D8 with a rear-end dragline bucket, stripped trees and brush off an island upstream from the dam, where the aggregate will be produced. After this equipment gets the brush removed, the dredge will take over and stockpile the aggregate where it can be reclaimed as needed during the completion of the job.

Sluicing of loose rock and dirt from the abutments worked out satisfactorily and did an excellent job. The water hissed through the nozzle at 350-pound pressure, which was sufficient to dislodge anything loose. The rock and other material then rolled to the bottom, where a power shovel could pick it up from a haul road.

Because of the brittle, hard nature of the abutment rock, drilling was shallow and loading light. USBR geologists were in attendance when the abutments got down close to pay rock, and their inspections governed the depth of the excavation. At the time of writing it appeared as if the excellent foundation material close to the surface would cause a slight under-run of rock excavation quantities, originally estimated at 90,000 cubic yards.

Excavation was carried on through the winter months insofar as possible, and it was expected that the diversion of the Missouri River could be accomplished by November. The first concrete

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is expected to be placed in April.

A Natural Dam Site

Canyon Ferry Dam is being built in what is probably one of the most efficient dam sites in the United States. With a total of only 456,000 cubic yards of concrete, the dam will impound 2,050,900 acre-feet of water for flood control, hydroelectric, and irrigation purposes. The dam is a simple gravity-type design, 1,000 feet long at the crest, with a height of 212 feet, of which 172 feet will be above streambed.

Located about 17 miles northeast of Helena, the project is only about 1¼ miles downstream from the existing Canyon Ferry Dam and Powerplant owned by Montana Power Co. The new reservoir will cover the old dam and power plant with 100 feet of water, and back up a lake 25 miles long to Townsend, Mont.

Conservation and control of now unused floodwaters in Canyon Ferry Reservoir will permit the irrigation development of about 310,000 acres of new land, and will permit providing supplemental water for about 196,300 acres, all in the basin above Fort Benton. Floodwater from a drainage area of 15,560 square miles will be stored in the reservoir.

This water will pass through three 18,750-kva vertical-shaft generators with direct-connnected exciters, driven by 23,500-hp turbines. After it passes through the power plant to generate 50,000 kilowatts, the water can be reused in downstream power plants. It will also help in the development of proposed irrigation projects in the Pick-Sloan Plan for the Missouri Basin.

Reservoir Inundates Old Plant

Canyon Constructors has 1,500 days from May 23, 1949, to complete the dam, but long before the completion date the water will back up to cover one of the historical landmarks of private power development in the nation.

Back in 1898, the predecessors of the Montana Power Co. built a low-head rock-fill dam across the river at Canyon Ferry. Many people still believe that Fort Peck Dam was the first structure to block the Missouri River, but Canyon Ferry Power Dam has been in for 51 years. It was followed by 6 others, downstream to Great Falls, which have been in much longer than Fort Peck.

The Canyon Ferry plant was the last word in design when it was built 51 years ago. It boasted the longest switchboard in the world. It was the first time that power had been raised from 550 to 66,000 volts for long-distance transmission, and electrical engineers of the day argued endlessly that the power could not be transmitted to the Helena mines, a distance of 18 miles!

The old powerhouse was made from cut granite blocks, quarried about 500 feet away. Those same granite blocks today look as if they were about a week old, and despite several bad earthquakes and many sub-zero winters, the mortar looks perfectly fresh and sound.

The original installed power units consisted of ten 750-kw turbine-generators, and those 51-year-old Westinghouse generators still deliver today their rated load. Several of the original main bearings are still good. The old exciter units are about as big as today's modern generators. The switchboard and dial gages are an ornate cheesecake of burnished copper. Some of the old wiring would cause today's electrical engineers to have fits. But that 51-year-old equipment still operates as smoothly as a well oiled sewing machine, at rated efficiency.

In its day, the Canyon Ferry plant has affected the growth of much of Montana. Its power has been used in mining, and in the economic life of the near-by towns. It is expected that the old dam may be breached with high explosives, but the old power plant will likely be left as is. Old-time residents who recall when stages stopped there will shed tears when waters from the modern Reclamation project cover the interesting old power plant.

C. & E. M. Photo

Drillers work on the right abutment of Canyon Ferry Dam.

Personnel

Canyon Ferry Dam is being administered generally by L. N. McClellan, Chief Engineer of the U. S. Bureau of Reclamation, assisted by Kenneth F.

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Gold Dredge Strips Canyon Ferry Dam Site

(Continued from preceding page)

Vernon at Billings as Regional Director, Harold E. Aldrich as Acting District Manager, and William P. Price, Jr., as Construction Engineer.

For Canyon Constructors, the project is under the supervision of General Superintendent E. W. Simpson, assisted by J. A. Shirley and Night Superintendent A. Wooten. H. J. Holt is in charge of carpentry, H. Ford is in charge of excavation, R. Neely is the Mechanical Foreman, and rigging is being supervised by S. Hurdle.

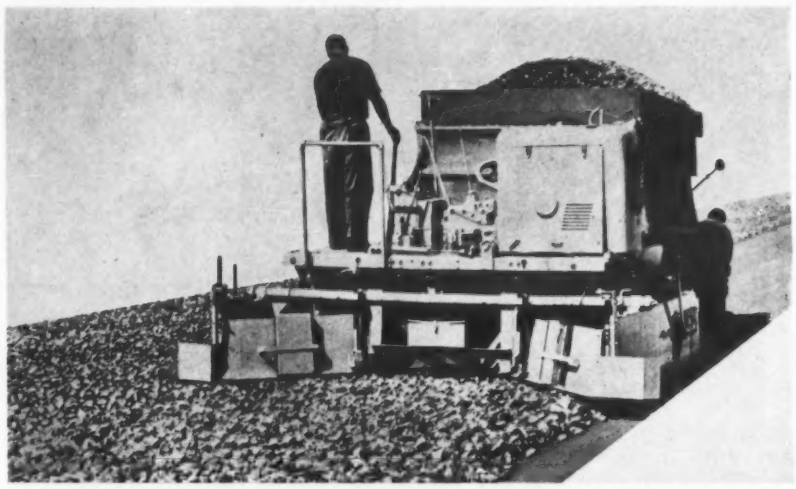
The placing of mass concrete this year will call for vacuum treatment and a number of other modern concrete practices, and this work will be detailed in a subsequent issue of CONTRACTORS AND ENGINEERS MONTHLY.

New Self-Propelled Aggregate Spreader

A self-propelled aggregate spreader designed to lay all base and surface aggregates, free-flowing bituminous mixtures, and plant-mixed stabilized soils, has been announced by the Jaeger Machine Co., Columbus 16, Ohio. The new machine has many unusual design and mechanical features for accuracy, speed, and flexibility of spreading operations.

The four-wheel drive of the unit is always on the subgrade or rolled course, never on the newly laid material. Thus, there is no displacement or disturbance of the laid aggregate to cause irregularities or uneven compaction. Its strike-off screed is carried by long straight-edge runners which ride smoothly on the subgrade unaffected by the up and down motion of the wheels. These runners average out irregularities of the subgrade, says Jaeger, while the closely adjustable screed produces a smooth and accurate surface. The screed is adjusted from the top by a hand crank for any desired thickness of material, crown, wedge, or leveling course.

The machine lays any size of aggregate up to 4-inch stone, in thicknesses up to 10 inches and in any width from 8 to 12½ feet. For widths from 10 to 12½ feet, a hand-operated crank extends the transverse telescopic shaft between the straight-edge runners, and simple inserts increase the screed width in increments of 6 inches. For widths from 10 to 8 feet, block-off plates are provided. Blender wings at the ends of the strike-off screed blend the joint between adjacent lanes. The 2-ton



The Jaeger self-propelled aggregate spreader lays any size of aggregate up to 4-inch stone, in thicknesses up to 10 inches and widths from 8 to 12½ feet.

hopper accommodates material from any size of truck.

Automotive transmission and a Continental gasoline engine offer 12 to 100-fpm forward speeds and ½ to 3½-mph reverse speeds. The unit is self-transporting. A hydraulic ram lifts the screed and runners up to 5 inches for quick backing and maneuvering.

Further information may be secured from the company by requesting Bulletin SPS-9. Or use the Request Card which is bound in at page 16. Circle No. 125.

Drill Kit and Accessories

A new 4-page catalog on electric-drill kits has recently been issued by Portable Electric Tools, Inc., 320 W. 83rd St., Chicago 20, Ill. These kits, the folder explains, combine the No. 1950 Zephyr portable electric drill with various assortments of accessories for buffing, cleaning, polishing, sanding, tool grinding, and other operations. Each kit is complete with a finished metal carrying case. Descriptions, prices, and illustrations are given for the 9 kits and for 15 different accessories for the drill.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 5.

The Boult form clamp system is designed to meet practically all curb and curb-and-gutter cross sections in general use in all parts of the country. The contractor uses his own wooden forms with the steel clamps.

New Curb and Gutter Construction System

A new form clamp system utilizing the Boult all-steel wood-form clamp has been devised by the Pacific Engineering Sales Co., 215 W. Fifth St., Los Angeles 13, Calif. The system is designed to meet practically all curb and curb-and-gutter cross sections in general use in all parts of the country, and to include the best features of steel form designs along with the low cost of wood forms. Without requiring any other parts, the system is adjustable for widths of top of curb from 4 to 8 inches. The side of the curb may be battered at any angle from the vertical. The face or front form can be supported, without staking, at any height up to 24 inches.

Features claimed for this system are universal application, adaptability to almost any curb construction, no stakes required through concrete gutter or slab, no tools to buy, and simple rugged construction.

Installation is quite simple, says the manufacturer. A stake is driven to line and the back form nailed to grade if desired. The self-locking clamp is inserted into two wedge-type holes in the stake. The face form is then nailed to the angle clamp. This clamp can now be slid in the grooves to the desired width, height, and batter. Tightened with two hand locking devices, the forms are now ready for concrete pouring.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 138.

Earth-Boring Machine

Literature describing an earth-boring machine designed to drill 10 to 72-inch holes 200 feet deep is available from the California Welding & Blacksmith Shop, 7222 E. Slauson Ave., Los Angeles 22, Calif. It gives details on the use of the machine for drilling pier foundations, for soil testing, for well or cesspool drilling, and for mineral exploration purposes.

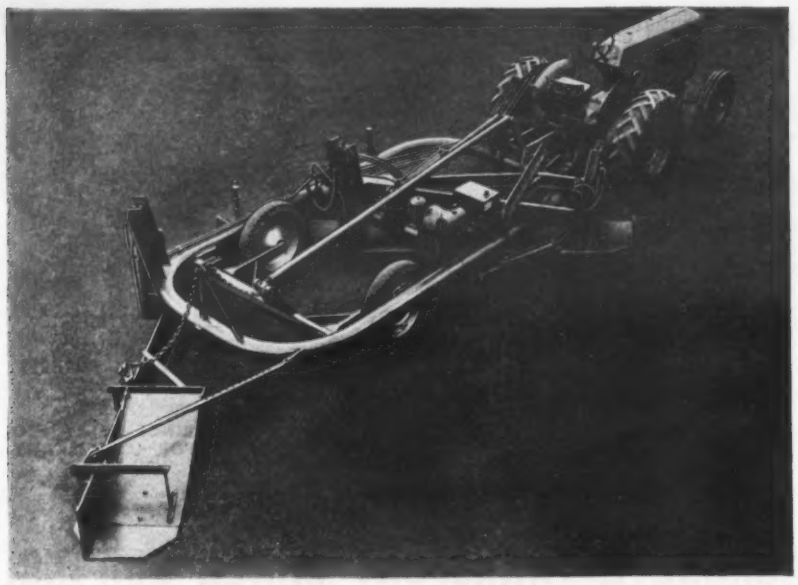
The catalog explains that the machine is built on skids for mounting on any truck chassis 1½ tons or larger. A gasoline engine behind the cab of the truck furnishes power for the drilling and for the hoisting mechanisms. The 32-foot collapsible derrick has a 20-ton capacity in drilling position. The California earth-boring machine is powered by a 100-hp stationary-type Ford Mercury gasoline engine with a heavy-duty radiator and extra-large oil pan designed to prevent overheating of the engine when drilling in hard strata. For a complete range in drilling speed, the engine is equipped with a 4-speed heavy-duty transmission.

Detailed descriptions and specifications are given on the derrick, the rig gear, the hoist, engine, bucket, and the kelly bar. On-the-job photos depict principal applications of the unit. The bulletin explains that a range of diameters from 10 to 72 inches is made possible by interchangeable buckets. Bucket unloading is accomplished with a simple hand tripping arrangement.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 143.

Link-Belt Men Transferred

Link-Belt Co., Chicago, Ill., announces the following changes in plant management personnel. Richard E. Whinrey will become Assistant General Manager at the Ewart, Indianapolis, plant on May 1. He has been replaced as Assistant General Manager of the Dodge plant in Indianapolis by Raymond S. Wood. Leslie J. Carson replaces Mr. Wood as General Manager at the Minneapolis plant. And William P. Ridsdale, who has been Chief Engineer at Dallas and Houston since 1946, has returned to Chicago to replace Mr. Carson as Chief Engineer of the Caldwell plant.



Created specifically for the maintenance of road shoulders beyond the pavement, this Lull unit features an automatic windrow eliminator.

Shoulder Maintainer

A new road tool, designed specifically for the maintenance of road shoulders beyond the pavement, and equipped with a patented automatic windrow eliminator, is offered by the Lull Mfg. Co., 3612 E. 44th St., Minneapolis 6, Minn.

. The front moldboard of the "one-pass" machine reaches to the outer edge of the shoulder and cuts, blades, and rolls the material inward, toward the pavement, cutting high spots and filling depressions and low spots. The sides and transfer moldboards, running parallel to the pavement, deliver the excess material to a rear spreading moldboard, which is positioned at an angle opposite to the front moldboard. The rear moldboard, equipped with the automatic windrow eliminator, distributes the remaining material evenly and free of windrows.

Units are made to handle 8, 10, 12, or 14-foot shoulders. Control is effected through a self-contained self-powered hydraulic system mounted on the maintainer. Blade angles may be set as required and positive hydraulic down-pressure applied as necessary. The entire machine, except the wheels, is raised or lowered by one master cylinder without affecting any of the independent blade adjustments, Lull says. The tubular rectangular frame is designed to be twistless and to absorb all stresses and strains.

The Lull shoulder maintainer is pulled by standard wheel-type tractors. Carried on large pneumatic rubber tires, it can be moved from job to job at speeds up to 20 mph. The maintainer has its own gasoline power plant to drive the hydraulic pump system, and is thus independent of the tractor power take-off.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 86.

Metallurgical Data Available On Tool and High-Speed Steels

Technical data certified by the metallurgical staff of Allegheny Ludlum Steel Corp., Pittsburgh 22, Pa., have just been published and are now available in a 16-page booklet titled "The Working of Tool and High-Speed Steels".

Called a Blue Sheet, the booklet gives specific information summarized from carefully checked laboratory and service tests on various grades in the Allegheny Ludlum line. The booklet begins with a simple selector chart and then tersely gives procedures and tabulations that form a working manual for makers and users of cutting tools and dies. Typical heads are: design, machining, cutting-tool angles, speeds, heat treatment, grinding.

This new publication is designed for use in conjunction with the other Blue Sheets in the series which give in detail the properties of each type of tool and high-speed steel.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 148.

Vibratory Equipment

The 1950 edition of the pocket guide to Jackson vibratory equipment is designed to supply the contractor and engineer with concise data concerning the current complete offerings of the Electric Tamper & Equipment Co., Ludington, Mich. The equipment and applications described in the 35-page booklet include: concrete vibrators for general and mass construction, paving, bridge decks, incasing beams and reinforcing members, pipe manufacture, and form vibrating; a vibratory soil compactor for bridge approaches, highways, airports, and sub-bases for concrete floors; concrete machines and attachments for wall surfacing, grinding, and drilling; and a line of portable power plants and transformers for the operation of vibrators and electric lights as well as power tools.

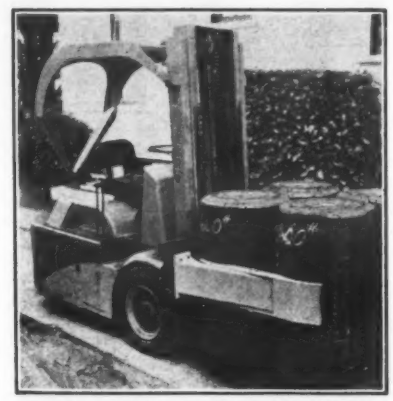
This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 93.

Drum-Handling Arms

One to four drums or barrels may be handled, without pallets, by the new four-drum-handling arms available for the Hyster Load-Grab attachment. This unit, which mounts on the Model 40 lift truck, is manufactured by the Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oreg.

Drums may be lifted in either horizontal or vertical position by means of hydraulic side pressure. When installed on the Revolving Load-Grab, the drum-handling arms may be used to turn over or dump drums or barrels. Rubber-faced gripping surfaces on the arms prevent scratching.

Capacity of the drum-handling arms rated at 23-inch load centers is 2,800 pounds with the regular Load-Grab and 2,380 pounds with the Revolving Load-Grab. Variances up to 1½ inches in drum diameters are automatically compensated for in handling. The drum-handling arms may be quickly and easily exchanged for other types of arms, Hyster points out.



Arms to handle drums or barrels are now available for the Hyster Load-Grab attachment.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 86.

C. & E. M. Photo
At the C. W. Good batch plant, a truck gets a load of cement from a Butler cement bin. The Schramm compressor which appears in the foreground supplies air to keep the cement from sticking to the sides of the bin.

Concrete Pavement Laid on Slag Base

20-Foot Black-Top Replaced With 24-Foot Concrete Road Near Hershey, Pa.

✦ THE Pennsylvania Department of Highways has replaced a 1.84-mile section of 20-foot bituminous surface-treated macadam on U. S. 422, between Hershey and Palmyra, Pa., with a 9-inch reinforced-concrete pavement 24 feet wide. The project is located in Dauphin County, Derby Township, about 12 miles east of Harrisburg, the state capital. C. W. Good, Inc., of Lancaster, Pa., had a $230,096 contract for the job which got under way near the end of June, 1949, and was completed in September. A 6-inch slag base course extends from under the pavement to tile underdrain at the outer edges of the shoulders.

The original black-top pavement, laid in 1923, was in bad shape, being cracked and broken up, and had a high 6 to 8-inch center crown. The new concrete, paved in two 12-foot lanes, slopes ⅛ inch per foot from the center line. In cuts it is flanked by 8-foot shoulders pitched 1½ inches to the foot, while on the fills the shoulders are 10 feet wide and slope at the rate of ¾ inch to the foot. All side slopes, both cut and fill, are 1½ to 1.

At the west, or Hershey, end of the project, the new road makes a transition to meet a 46-foot concrete pavement laid in 1928. Another transition is made at the east or Palmyra end where another concrete pavement, laid 34 feet wide in 1925, is joined. During the construction local traffic was maintained, but through traffic was detoured over paralleling U. S. 322, which at this point is close to U. S. 422.

Special Slag Subgrade

To start operations the contractor tore out the old bituminous pavement by ripping it up with a LeTourneau Rooter pulled by an Allis-Chalmers HD-19 tractor, and moving the material along with tractor-scraper units. The broken-up black-top was spread over the shoulders by a Caterpillar D8 dozer which also brought the roadbed to proper grade. Then a special slag subgrade was laid as an insulating course for the concrete pavement, extending out through the shoulders.

Slag was supplied by H. J. Deck of Lebanon, Pa., and delivered to the job in trailer trucks carrying 12 to 14 tons a load. The material was run-of-crusher slag, graded from 4-inch down to fines, with enough of the fine material present to prevent any excessive mortar loss from the freshly laid concrete. The slag was put down in two courses of 4-inch loose depth each and spread by the D8 dozer. Each course was rolled by three Huber 10-ton 3-wheel rollers so that the total final compacted depth of the slag was 6 inches. A Galion motor grader did the finish shaping of the base course.

C. & E. M. Photo
An International truck dumps to the skip of a Rex 34-E dual-drum paver on U. S. 422.

Concrete Batch Plant

In the meantime, the contractor set up his concrete batch plant at the east end of the job near the stone quarry of H. K. Smith, Palmyra, Pa. Job stone came from this quarry, while sand was shipped in by rail from the Allenwood Steel Co. of Wharton, N. J. The plant is on a siding of the Reading Railroad. Both the fine and coarse aggregate were stored in bins at the quarry. Portland cement, with air-entraining Vinsol resin interground at the mill, was supplied

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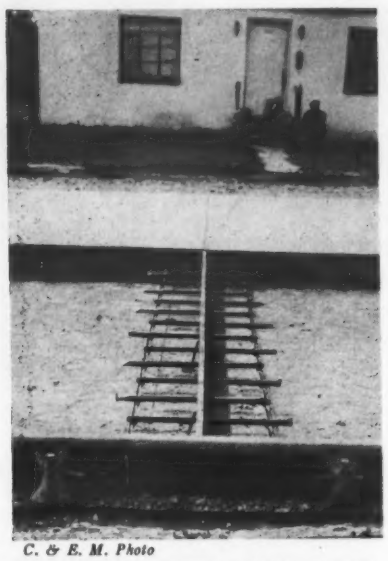

C. & E. M. Photo

A Bethlehem expansion joint in place between Heltzel forms on a 12-foot lane of U. S. 422. C. W. Good, Inc., of Lancaster, Pa., was the paving contractor.

Exactly 8,600 linear feet of Heltzel steel forms were on the job, and at least 2,000 feet of formed grade was always prepared ahead of the paver. The forms were set in a trench cut by a Cleveland Formgrader, and an R-B Finegrader handled the final adjustments in the subgrade between the forms. This was followed by rolling with an Austin-Western 8-ton tandem roller, and then a planer was pulled over the 12-foot lane to make sure that the full 9-inch depth had been obtained. This was checked with a scratch template, voids were filled in with crushed-stone screenings, and the grade was given a final compaction with a Fordson 5-ton tandem roller.

Every 61½ feet a contraction joint was laid out on the subgrade, and every fourth joint was an expansion joint of Flexcell bituminous fiber expansion material, ¾ inch thick x 8¾ inches deep, leaving the top of the joint ¼ inch below the surface of the concrete. Bethlehem Steel Co. assemblies were used

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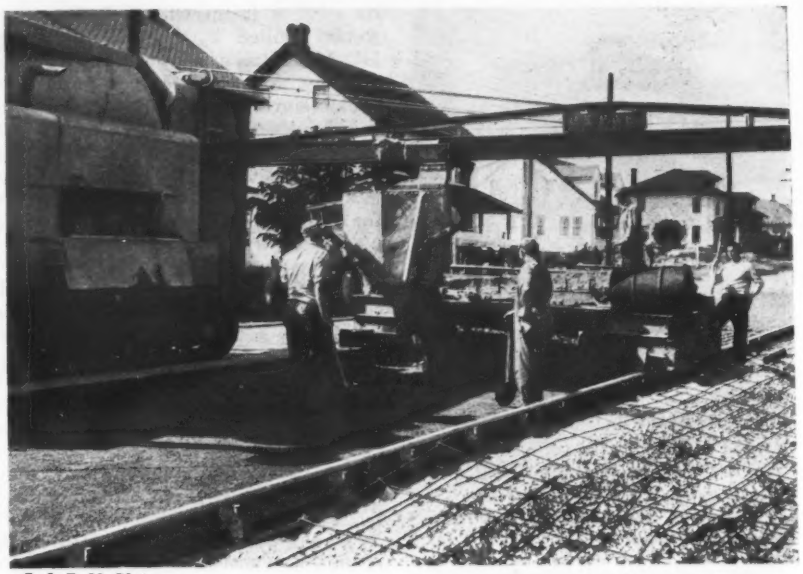


C. & E. M. Photo

A Rex paver dumps a bucket of concrete in front of a Blaw-Knox paddle-type spreader on the Hershey 1.84-mile project.

Concrete Pavement Laid on Slag Base

(Continued from preceding page)

in bulk by the Allentown Cement Co. Catasauqua, Pa., and the Nazareth Portland Cement Co. of Nazareth, Pa. It was shipped by rail to the quarry where it was unloaded by the conventional under-the-track worm gear and enclosed elevator to a Butler 250-barrel cement bin. A Schramm compressor at the plant forced air into the bin to keep the cement from sticking to the sides.

About six hours before being batched, the aggregate both in the stockpiles and the bins was wet down with a hose, while the necessary aggregate was always stockpiled from 18 to 24 hours before a section of road was built. A 1 : 2 : 3.5 mix was used, and the weights of a typical 8½-bag batch were as follows:

Cement	799 lbs.
Sand	1,620 lbs.
2B stone	1,420 lbs.
3A stone	1,404 lbs.

In this batch the surface moisture in the aggregate totaled 10.9 gallons or 91 pounds. At the paver 31.1 gallons or 259 pounds of water were added bringing the total water in the batch to 41.9 gallons, or 4.93 gallons of water to a bag of cement. The batch totaled 5,502 pounds in weight, and yielded 36.72 cubic feet or 1.36 cubic yards of concrete. The weight per cubic foot was 149.8 pounds. The slump averaged 1½ inches. By the bucket test it showed 3.1 per cent of air, and 3.8 per cent by the air meter.

The gradation of the aggregate was as follows:

Sieve Size	Per Cent Passing		
	3A Stone	2B Stone	Sand (A)
2½-inch	100	"	"
2-inch	90-100	"	"
1½-inch	35-70	"	"
1¼-inch	"	100	"
1-inch	"	90-100	"
½-inch	"	20-50	"
⅜-inch	"	"	100
No. 4	"	0-10	99-100
No. 20	"	"	40-75
No. 50	"	"	10-30
No. 100	"	"	1-8

Paving Operations

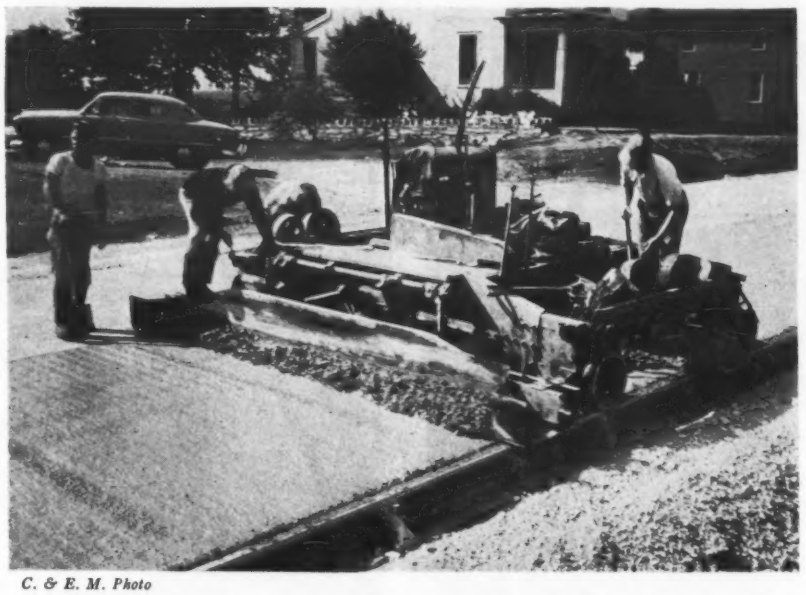
Paving was done in separate 12-foot lanes. The westbound half of the road was done first with the Rex dual-drum 34-E paver, 35-foot boom length, working from east to west and stationed outside the forms. Then the other half of the highway was finished from west to east, with the paver operating over the paved slabs. Thus the batch trucks ran over the new concrete for half the job. To protect the concrete, rubber cleats off an Army half-track were bolted to the treads of the paver. They furnished a satisfactory cushion, and by avoiding any sharp turning movements the paver operator made the cleats last the length of the job.

both at the contraction and expansion joints. The same company also supplied the dowels and pavement reinforcing for the job.

At the contraction joints a steel plate takes the place of the bituminous fiber material in the expansion joint. The top of the plate is also well below the top of the slab, and both types of joints have removable caps which were taken off by the finishers after the concrete had set up slightly.

Done in 12 Days

Both transverse joints were pierced with 1 x 18-inch steel dowels on 12-inch centers. At the expansion joints every other dowel was painted on alternate sides with bitumen, as were the forms, and also the side of the first slab at the center of the road. The 12-foot lanes were tied together by a keyway formed by bolting a metal strip to the form at the inside of the initial lane, and also by longitudinal dowels. The steel dowels at the longitudinal construction joints are 9/16-inch hook-bolt type placed on 5-foot centers and extending 6 inches into each side. After the forms for the first half of the pavement were removed, the remaining sections of the dowels were bolted into place to make the tie.



C. & E. M. Photo

The Jaeger dual-screed finishing machine followed the spreader in the C. W. Good paving line-up on this highway project in Dauphin County, Pa.

Batches were hauled to the paver an average distance of 1½ miles in a fleet of 12 trucks holding two batches each, with the cement in separate metal boxes. Some trucks were owned by the contractor and others were rented. After 1 minute 34 seconds of mixing time in both drums of the paver, the concrete was discharged between the forms. Water for the mix was supplied to the paver by two Mack tank trucks holding 2,000 gallons each. They obtained the water from a spring in Hershey, and each was equipped with a Jaeger 3-inch pump at the rear for feeding the water to the paver through a 100-foot section of 2-inch hose line.

A Blaw-Knox paddle-type spreader struck off the concrete 2 inches below the top of the forms, then backed up so that the steel mesh reinforcing might be laid in place. The paver then placed more concrete to cover the steel, and the spreader leveled this off with the top of the forms. The concrete was spaded along the forms, but not vibrated. Behind the spreader came a Jaeger dual-screed finishing machine which made two passes over the surface. This was followed by a Koehring Longitudinal Finisher.

The finishers then checked the pavement with hand floats and 10-foot straight-edges, and pulled a burlap drag along the surface. They pulled the caps and edged the joints with a ¼-inch radius tool, and spread on top the quilted cotton mats that were used in curing. The mats were kept wet for 72 hours and then removed. Tank trucks with spraybars at one side in the rear ran alongside the fresh concrete to keep the mats soaked. Traffic was kept off the new pavement for 10 days. The joints were poured with asphalt heated in an Aeroil heater.

Paving started on August 8, and actually took only 12 working days, or 6 days for each lane. This was at the rate of about 1,600 feet of 12-foot lane during a 9-hour day. The real average was higher because of the widening that was required at both ends; near Hershey four lanes were paved. The best record for single-lane paving was 2,275 feet for one day's operation.

Quantities and Personnel

The major items in this 1.84-mile paving contract included the following:

Excavation	18,202 cu.yds.
Special subgrade, 6-inch slag	38,077 sq.yds.
Reinforced-concrete pavement, 9-inch	26,795 sq.yds.
Underdrain, 6-inch	12,550 lin.ft.

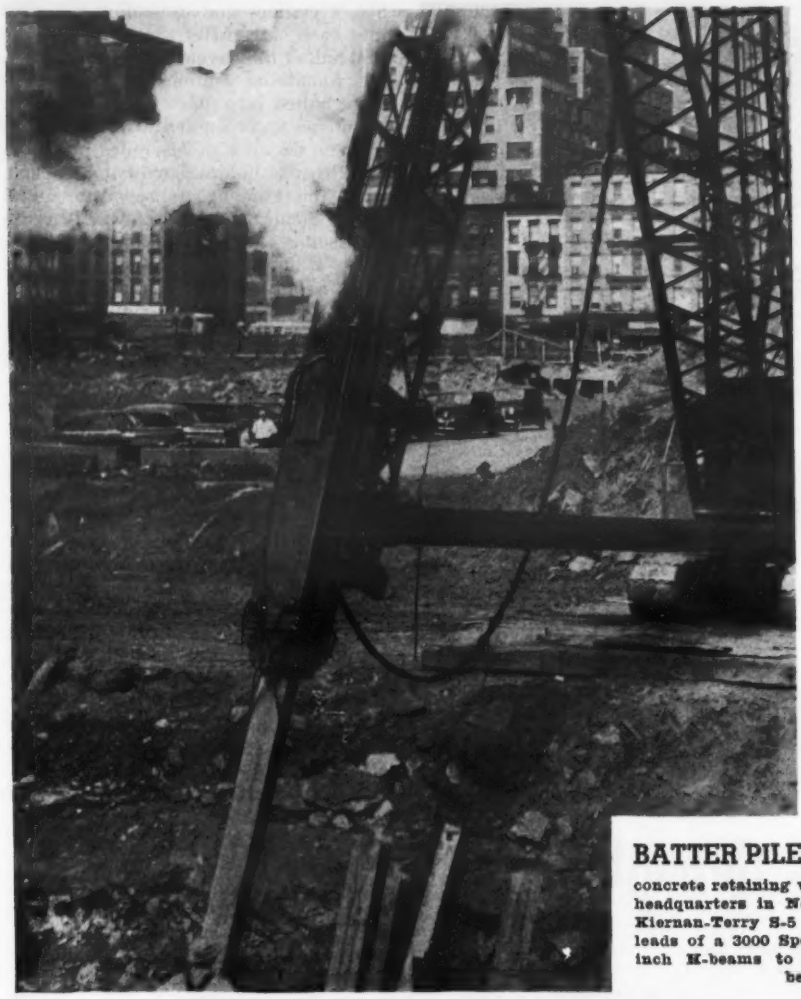
During the peak of the construction, C. W. Good, Inc., of Lancaster and Reading, Pa., employed a force of 118 men. W. C. Henderson was the Superintendent, and Joseph Brady, Office Manager.

For the Pennsylvania Department of Highways, C. O. Miller was Project Engineer. The job was located in District 8 which is headed by N. A. Staples, District Engineer. E. L. Schmidt is Chief Engineer of the Department.

Magnesium-Ladder Bulletin

A circular describing extension and single ladders made of lightweight structural magnesium is available from The Patent Scaffolding Co., Inc., 38-21 Twelfth St., Long Island City 1, N. Y. These ladders are designed to combine light weight with maximum strength. The circular illustrates and describes all features of the Safelight ladders. It covers the extension ladders available in sizes ranging from 16 to 40 feet and single ladders from 4 to 20 feet. It also presents magnesium stepladders available in heights ranging from 4 to 10 feet.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 40.



BATTER PILES go down on a 4 to 1 slope to support a concrete retaining wall at the site of U. N. headquarters in New York City. A McKiernan-Terry S-5 hammer in the 85-foot leads of a 3000 Speedcrane drives the 12-inch K-beams to refusal in Manhattan bedrock.

Steel Piles Driven For U. N. Buildings

Long H-Beams to Rock Are Driven Both Straight and Battered, the Latter on an Unusual 4 to 1 Slope

✦ STEEL H-beams, from 30 to 108 feet long are driven to various depths at the site of the United Nations headquarters in New York City to support the foundations of the General Assembly, the conference area which includes the Meeting Hall, and a three-story underground garage beneath the headquarters. Driven to solid rock, the piles are both straight and battered. The vertical piles support concrete piers for the buildings, while the battered piles, driven on a difficult and unusual 4 to 1 slope, support a concrete retaining wall. No piles are used in the construction of the 39-story Secretariat building, the foundation of which is partly on bedrock and partly on concrete piers. (See C. & E. M., Jan., 1950, pg. 5.)

Along East River Drive, piles will provide footings for the columns supporting a roof over the drive. This roof will completely cover the southbound lanes of the drive, and will cantilever over the outside northbound lanes bordering the river. Approximately 2,100 steel H-piles are included in the contract. Of this number, 220 are under the 20-foot-high retaining wall that runs along the East River Drive from East 46th to East 48th Streets, and are

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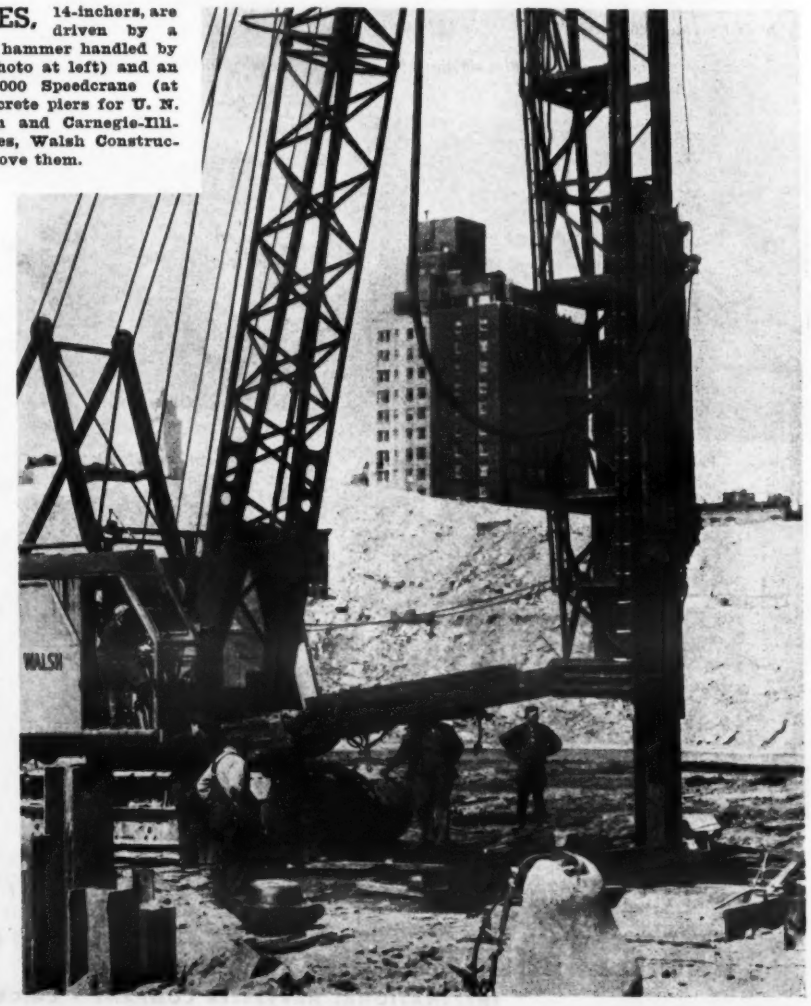


VERTICAL PILES, 14-inchers, are driven by a McKiernan-Terry S-8 hammer handled by a 3500 Speedcrane (photo at left) and an S-5 handled by a 3000 Speedcrane (at right) to support concrete piers for U. N. buildings. Bethlehem and Carnegie-Illinois supplied the piles, Walsh Construction Co. drove them.

driven on the 4 to 1 batter. The rest of the piles are vertical. The piles were supplied by both Bethlehem and Carnegie-Illinois in 8, 12, and 14-inch sizes. Driving was done by the Walsh Construction Co., one of the four New York City firms making up the syndicate holding the general U. N. contract.

Pile Driving

The steel piles were delivered to docks on the East River at the north end of the project by lighters, and transferred to pole trucks. The trucks hauled them to a central spot on the site where they were unloaded by a crane. From there a rubber-tired Tournadozer snaked the piles along the ground to the driving rigs. This required adroit maneuvering over a construction site well taken up with equipment and materials. The Tournadozer, however, pulled the piles, one by one, as close as possible to where they were wanted, then backed out over the pile, and pushed it with the blade right up to the driver. A line from the rig was attached to the beam for lifting it into the leads.

Driving was done by two Manitowoc Speedcrane oil-burning rigs—a 3500 and a 3000 machine. The former is a 100-ton rig with an 80-foot boom and 90-foot steel leads; the latter is a 45-ton rig with an 80-foot boom and 85-foot steel leads. In general, the 3500 machine handled the 14-inch piles while the 3000 machine drove the 8-inch or 12-inch beams.

Two McKiernan-Terry hammers, an S-8 and an S-5, were used with the rigs; they delivered respective blows of 26,000 and 16,000 foot-pounds. These hammers are part of the McKiernan-Terry line of single-acting pile hammers which range in size from the S-3 with a 3,000-pound ram all the way up to the huge S-14 which has a 14,000-pound ram.

The piles were driven to refusal in the solid bedrock. For the pier work, the piles were driven to form clusters of from 5 to 25 piles. Each cluster is capped by a concrete base to serve as a column footing.

Batter Piles

According to Karl B. Randall, veteran Superintendent for the Walsh Construction Co., this marks the first time that long steel H-piles have been driven on such a flat batter as 4 to 1. Yet the piles were driven in as satisfactory a manner as if the more common 2 to 1 or 3 to 1 batters were employed. The average length of pile under the retaining wall is 70 feet, with some lengths reaching 108 feet. For sections over 65 to 70 feet in length, splicing was necessary. In making a splice, six plates were used, two on each flange and one on each side of the web. The plates are ¾-inch stock, 6 inches wide x 30 inches long, and they were welded to the beams by seven Hobart 300-amp electric welders.

For the batter piles 12-inch beams were used. They were driven by the S-5 hammer; both hammers were used in the vertical driving. Many obstacles to driving were encountered in this river strip site that had been filled in over the years. Boulders, rock and timber cribbing, old wharves, and even sunken wooden ships were encountered. Yet the piles went through, at the rate of 11 a day for each of the single-acting hammers. A crew of 30 was engaged in pile driving, working a single-shift 40-hour week.

Pile driving at the U. N. site got under way in March, 1949, but progress was not continuous because of the many other construction operations that had to precede the pile work in various parts of the site. The piling was scheduled for completion last month.

Need information on equipment? Use Request Card at page 16.

Improved Trencher

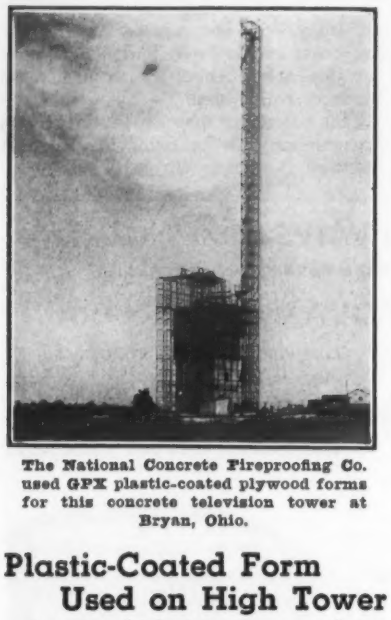
Improvements on the McDonald E-Z Mount trencher have been announced by The Mississippi Engg. Co., Inc., Grand Mound, Iowa. These include a spiral-miter gear-box unit, Fafnir pillow blocks, forged-steel cutter blades, and an electrical raising and lowering device. Company officials say that these features will increase the efficiency of the unit considerably for digging trenches for foundations; irrigation lines, water, gas, and electrical conduit lines; sewer lines; and other digging jobs.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 127.

Precision Flame Cutting

A new bulletin issued by Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, Ill., illustrates intricate and unusual steel shapes supplied by this firm, cut to customer's order with Electric Eye flame-cutting equipment. Typical of some of the irregular shapes furnished are sprockets, grinding wheels, boom bars, crankshafts, machine and equipment frames, and ornamental pieces. Shapes cut with the Electric Eye machine are said to have unusual accuracy, with the result that fabricating costs are lowered and new opportunities are opened up to use parts made of rolled steel.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 2.



The National Concrete Fireproofing Co. used GPX plastic-coated plywood forms for this concrete television tower at Bryan, Ohio.

Plastic-Coated Form Used on High Tower

A series of television towers is being built for the Long Line Division of the Bell Telephone Co. to provide a radio relay for television transmission between New York City and Des Moines, Iowa. Two of these towers, built at Bryan and Whitestone, Ohio, are 27 x 27-foot concrete structures over 207 feet high.

The general contractor for these two towers, the National Concrete Fireproofing Co., Cleveland, Ohio, is using the new GPX plastic-coated plywood forms for the concrete work. The slip-forms are made of four sections of 4 x 8 panels and are raised at a rate of 29 feet per week, to provide a minimum 7-day cure. The GPX forms, manufactured by the Georgia-Pacific Plywood & Lumber Co., were used because of their abrasion-resistant qualities. A single form will be used for the full tower height and it will be subjected to a number of re-uses in addition to the wear in raising.

Further information may be secured from the Georgia-Pacific Plywood & Lumber Co., 350 Fifth Ave., New York 1, N. Y. Or use the Request Card at page 16. Circle No. 103.

Cable-Reel Truck

A cable-reel truck, designed for handling reels of various diameters and widths without requiring adjustment, is announced by the Lyon-Raymond Corp., 25463 Madison St., Greene, N. Y. Although trucks of different sizes and capacities are available, a model suitable to handle the user's largest reel will also pick up and transport smaller ones.

The lifting arrangement incorporates two hydraulic hoists which raise the carrying arms of the truck. One of the standard models provides a 23-inch lift and will handle reels from 24 to 60 inches in diameter and up to 36 inches wide. This truck has a 4,000-pound capacity. Others can be furnished in capacities from 2,000 to 10,000 pounds. A single-speed hydraulic hand pump provides the power to elevate the lifting arms. Lowering is controlled by a finger-tip release lever. The towing handle has a spring arrangement which keeps it in an upright position when released.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 89.

Trailers for Hauling Sand, Stone, and Gravel

An illustrated folder describing four models of material-hauling trailers is offered by the Landis Steel Co., P. O. Box 248, Picher, Okla. These models are designed to meet a variety of hauling problems and are available in capacities ranging from 6 to 40 cubic yards. A complete description, illustrations, features, and specifications are presented for each of the models. The Landis heavy-duty 60,000-pound axle, the folder points out, is available in any desired track length. The wheels are designed for use with either 14:00, 16:00, or 18:00 x 24 tires mounted on Goodyear 11:25 or 13:00 x 24 EMW rims.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 95.

New Plastic Pipe Has Variety of Uses

A new plastic pipe has recently been developed by the Carter Products Corp., 10157 Meech Ave., Cleveland 5, Ohio. Its applications include the transmission of water and natural gases, plating tank solutions, chemicals (cold), domestic and industrial sewage, and corrosive gases. The pipe also has application in land drainage systems.

Carlon EF is extruded from a specially compounded organic plastic. While its tensile strength is not as great as that of metallic pipe, it is more than sufficient for normal applications, the company says. Estimated bursting pressures range from 540 psi for ½-inch pipe to 115 psi for 6-inch pipe. Its impact at temperatures ranging from minus 50 to 140 degrees F is similar to that of soft rubber. In addition, this new plastic pipe has resistance to chemicals and sunlight.

Like all plastics, Carlon EF is an insulator and will not form a galvanic couple. The problem of electrolytic corrosion does not exist with this pipe. Physical characteristics of Carlon EF include a tensile strength of 1,400 psi, negligible water absorption, slow burning rate, dielectric strength of 500 volts per Mil (⅛-inch thickness), and flexural strength from 1,500 to 1,700 psi.

Light weight, flexibility, corrosion resistance, and long service life are features Carter cites for plastic pipe. Its ease of handling is said to eliminate the need for heavy materials-handling equipment for pipe installation. A 25-foot length of 6-inch pipe, for example, weighs about 55 pounds and a 100-foot coil of 3-inch pipe weighs approximately 91 pounds.

Plastic pipe needs relatively few fittings because it can be curved somewhat to follow either a ditch line or surface contour without damage to the pipe or impairment of flow characteristics. In addition, the elasticity of this pipe exceeds the percentage of expansion of freezing water. Line drainage in cold climates is not of critical importance. Carlon EF pipe and fittings (with stainless-steel clamps) are available from stock in all standard pipe sizes ranging from ½ to 6 inches. Standard fittings in metal and plastic are available on order.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 76.

Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Local License Taxes As Part of Job Cost

THE PROBLEM: *Was a Government contractor on a cost-plus basis entitled to reimbursement for license taxes paid the state and county in which the contract was performed?*

THE ANSWER: Yes. (J. A. Jones Construction Co. v. United States, 84 Fed. Supp. 643, decided by the United States Court of Claims.)

The principal facts upon which the decision was made were these: The contract required the contractor to procure all necessary permits and licenses and to abide by all applicable laws of the state, Tennessee. A law of that state required that the contractor pay the state and county a minimum license fee of $25 as a contractor, plus a percentage of aggregate contract prices. The contractor, doing no other business in Tennessee, paid the taxes, $3,831.50, covering himself and subcontractors.

The contract specified that the contractor should be reimbursed for such "actual expenditures in the performance of the work as may be approved or ratified by the contracting officer," including "any disbursements required by law, which the contractor may be required on account of this contract to pay . . . and, if approved in writing by the contracting officer in advance, permit and license fees," etc.

The contracting officer first allowed the reimbursement, but later rescinded it, because the Board of Contract Appeals and the Judge Advocate General ruled that license taxes paid by the contractor could not be regarded as part of the job cost, but as the cost of the contractor's privilege to do business in Tennessee.

The Court of Claims rejected the Government's contention that the contractor's expenditure involved "overhead expense", which the contract provided should be excluded in computing the job cost.

The principal paragraphs of the court's opinion read:

"The nature of these costs was closely connected with the cost of performing the plaintiff's contract. Their amount depended upon the size of the contract involved and were proper items which would be taken into consideration as necessary costs in the preparation of a 'lump-sum' bid. It is also true that the 'fixed-fee' involved in this case would be reduced by these taxes in proportion to the items of cost which made up the aggregate sum upon which the tax was based."

Indicating that considerable stress was laid by the court on the fact that the contracting officer originally approved the contractor's claim for reimbursement, the opinion, says:

"He was required to exercise his discretion . . . in a reasonable, rational manner. We do not believe that his determination can be said to be so unreasonable or arbitrary as to constitute an abuse of discretion.

"There was no misunderstanding between the parties as to the meaning or interpretation of the provisions of the contract. Both were satisfied with the arrangement until the Judge Advocate General of the United States indicated that license fees could not be considered an item of cost in the performance of a specific contract.

"In deference to this ruling, the contracting officer reversed himself and not only caused the previous allowances to be deducted from future payments under the contract, but denied reimbursement for similar payments made afterwards. We can understand his respect from the administrative standpoint for the opinion of the Judge Advocate General and his actions under the circumstances, but the contracting officer had in the exercise of his independent judgement made his decision under express authority given him by the contract itself in a reasonable exercise of his discretion. We think his original determination was in accordance with the contract and is entitled to prevail."

Right to Compensation Under Illegal Contract

THE PROBLEM: *A township board made a contract for road work that was invalid: first, because it was let without competitive bidding required by statute, and, second, because it involved an expenditure of more money than the township had on hand or could collect by tax levy.*

On completion of the job and its acceptance by the town board, could the contractor, although prevented from collecting the contract price, compel payment of the reasonable value of the labor and materials furnished up to the amount of funds that the township board could have legally contracted to spend on the job?

THE ANSWER: Yes. (Kotschevar v. Township of North Fork, Stearns County, Minn., decided by the Minnesota Supreme Court, July 8, 1949.)

The opinion of the Court contains references to many cases previously decided by it—to the effect that if a public board lets a contract in good faith without calling for bids as required by statute, and the work is done according to contract and accepted, the contractor will not be denied the right to collect some pay for the work and labor he has furnished; that he will be permitted to compel payment of a reasonable sum, measured by the benefit conferred upon the municipality or other public subdivision for which the work was done. In this respect, the courts of Minnesota and a few other states disagree with the courts of many—probably most—other states.

The Minnesota court and some others hold that if a public board has a right to contract for a certain type of work—as the township board had a right to do in this case—the contractor should not be penalized to the full extent of labor and materials furnished by him merely because some such statutory formality as competitive bidding was not observed—if the award was made in good faith and the work has been performed and accepted and is of public benefit. In short, the court draws a distinction between a contract that is utterly void because a public board is not empowered by law to enter into it, and a contract that it is empowered to make while observing certain formalities.

The courts of other states refuse to draw any such distinction. They declare that a contractor can recover nothing for work done when the contract has been let in violation of a statute, whether the violation

(*Concluded on next page*)

Avoid Legal Pitfalls

(*Continued from preceding page*)

relates to the power to contract for the particular kind of work or to the method of letting the contract.

As to the amount that the contractor was allowed to collect in this case, it was undisputed that had the contract been legally awarded and had the contract price been within the amount that could have been expended, he would have been entitled to $11,874.76. But the court allowed him to collect only $5,141.31, plus interest. This represented the proceeds of the maximum tax levy voted for road purposes for the particular year and legally applicable to the particular job.

Concrete-Mix Content Increases Contract Cost

THE PROBLEM: *A river-lock construction contract permitted the Government to determine the content of the concrete mix to be used. The contractor was required to use Class A concrete around certain ducts but was paid only the unit price applicable to Class B. (1) Was the contractor entitled to the difference in prices, although the difference in cost was slight? (2) Was the contractor entitled to extra pay for distributing a stiff mix that made the concrete stronger than the minimum strength called for by the contract?*

THE ANSWER: (1) Yes. (2) No. (Joseph Meltzer, Inc. v. United States, 77 Fed. Supp. 1018, decided by the United States Court of Claims.)

On the first question, the court said: "Under the orders of the Government's agents who had the power to determine what the content of the concrete mix should be, the plaintiff placed 687.08 cubic yards of Class A concrete around certain ducts in the lock walls and cross-covers. For this the plaintiff was paid only the price of Class B concrete, $7.75 per cubic yard. The unit price of Class A concrete was $20 per cubic yard. The additional actual cost to the plaintiff was only a fraction of the difference, $12.25, between these two prices, but we think that the contract required the Government to pay the stipulated Class A unit price."

On the second question the court dealt with plaintiff's claim that it was not allowed to use enough water in its concrete mix to make the concrete workable. The plaintiff said that the stiffness of the mix caused great extra expense. Additional men had to be hired to vibrate and spade the concrete, and the efficiency of concrete-distributing machines was greatly impaired. The Court of Claims replied:

"The concrete mix, including the maximum permitted water content, was stated in the specifications. It was . . . a stiff mix, and the plaintiff should have known that it would have some difficulties in forcing this stiff concrete through the pipes of its . . . distributing machine. The Government, having specified the mix and not having specified the distribution system, was not obliged to alter the mix to suit the convenience and efficiency of the distribution system. And the fact that more vibrating and spading would be necessary to properly settle a stiff mix than a more fluid one was also apparent from the specifications. Moreover . . . the Government permitted the plaintiff to put more water in the mix than the maximum permitted in the specifications. The fact that insistence on adherence to the specifications produced a concrete with a breaking strength considerably in excess of the minimum required by the contract is, of course, no evidence of a breach of the contract."

Work Organization Cost; Surety Held Not Liable

THE PROBLEM: *Did a highway contractor's bond to pay for "labor furnished in construction of a highway" cover services rendered by a haulage subcontractor in assembling trucks and equipment owned by others and used in the haulage?*

THE ANSWER: No. (Lucas v. Western Casualty & Surety Co., 176 Fed. 2d 506, decided by the United States Court of Appeals, Tenth Circuit.)

In this lawsuit, which originated in Oklahoma, plaintiff, the haulage contractor, had partly performed his contract when the prime contractor terminated the haulage agreement. Plaintiff sued for a balance due for completed work and for damages because he was prevented from fully performing his contract. And he attempted to hold the surety on the bond liable for $1,250, claimed to be the reasonable value of his services in assembling trucks and equipment and effecting an organization to haul the materials involved.

The court decided that labor involved in moving the material was clearly "labor" covered by the bond, but that for pay for services in assembling trucks, organizing the work, etc., the haulage contractor must look to profits derived from part performance of the contract and damages for breach of the agreement by the prime contractor.

Right to Extra Pay For Rock Excavation

THE PROBLEM: *A state road contract provided: "All lime rock, shell rock, or Selma chalk common in this vicinity, encountered on construction, shall be classified as and paid for as common excavation." The contractor claimed that he encountered varieties of such rock and chalk not common in the vicinity and requiring explosives or a power shovel of greater than usual capacity. Did the State Highway Director, with the approval of the Governor, have a right to make a supplemental agreement for extra payment?*

THE ANSWER: Yes (McFarland v. McKee, 41 So. 2d 574, decided by the Alabama Supreme Court.)

First, the court said that the supplemental agreement did not violate a provision of the Alabama Supreme Court which forbids state officers to agree on behalf of the state to expend funds except as authorized by law.

The original contract, which was signed by the State Highway Director and approved by the Governor, provided that extra work should be done under supervision of the State Construction Engineer, and that his decision should be final. The court said that this fact did not prevent the Director from making the supplemental agreement, with the approval of the Governor.

The question arose as to whether or not the contractor could have insisted that the Construction Engineer was the only person empowered to determine his right to extra pay. The court said it was not necessary to determine whether or not he could have insisted, because he did not so insist. When the governing statutes empowered the Engineer to represent the Director in the performance of the contract, it was not their intent to deprive the Director of power to make such a supplemental agreement as was made in this case, with the consent of the Governor.

Segregation of Damages

THE PROBLEM: *Two bonds were issued by the same surety company covering separate Federal jobs done by the same contractor. The contractor did not fulfill his obligation to pay at least the minimum wages prescribed by the Secretary of Labor. Was the surety entitled to a dismissal because the Government failed to segregate the damages recoverable under each separate bond, since the damages recoverable under both bonds could be definitely ascertained?*

THE ANSWER: No. (United States v. Continental Casualty Co., 85 Fed. Supp. 573, decided by the United States District Court, Eastern District of Pennsylvania.)

The court noted that this case presented different questions than a suit by the Government for breach of separate bonds furnished for different contractors by the same bonding company. There it had been decided that damages must be segregated. The court said that in this case the bonding company could have required the contractor to segregate his labor costs as a condition to bonding him, but that it was difficult to see how the company could be prejudiced by his failure to do so, in the absence of such requirement.

The court also observed that in the construction industry it is unusual for a contractor engaged on numerous jobs to allocate all labor costs with exactness to each particular job, especially where employees may have worked on several jobs in the course of a day.

Delay Without Damage

THE PROBLEM: *Was a Government contractor entitled to an allowance because of the Government's delay in furnishing drawings in view of the fact that during the same period the contractor was delayed by inability to secure labor.*

THE ANSWER: No. (J. B. McCrary Co. v. United States, 84 Fed. Supp. 368, decided by the United States Court of Claims.)

Roebling's new tapered sleeve splice makes it unnecessary for users to splice their own sling loops.

New Tapered Sleeve For Safe Sling Lifting

A new tapered sleeve splice, designed to introduce safety and economy in sling-lifting operations, is now manufactured by John A. Roebling's Sons Co., Trenton 2, N. J. This splice makes it unnecessary for users to splice their own sling loops. The rolled loop and single tapered sleeve provide greater flexibility and compactness, and will develop the full rated strength of the preformed Blue Center steel-wire-rope sling, according to Roebling.

The new Roebling all-purpose sling with tapered sleeve splice is adaptable to numerous lifting jobs. It is stocked in standard sizes and lengths ready for immediate use. For sizes between ¼ and 1⅛ inches, a 6 x 19 rope is used. For sizes from 1⅛ to 2 inches, the 6 x 37 construction is used. Slings made of wire rope with fiber core can be supplied if desired.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 63.

Portable Drinking Unit

A folder describing the Dobbins portable drinking fountain, designed to provide a sanitary supply of fresh drinking water for men in the field, has been prepared by the Dobbins Mfg. Co., W. Beardsley Ave., Elkhart, Ind. The bulletin illustrates and describes the construction and applications of this 4-gallon fountain, as well as the carrying strap, mounting bracket, spill cup, and a salt-tablet dispenser available as accessories.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 109.

For Eutectic in Southwest

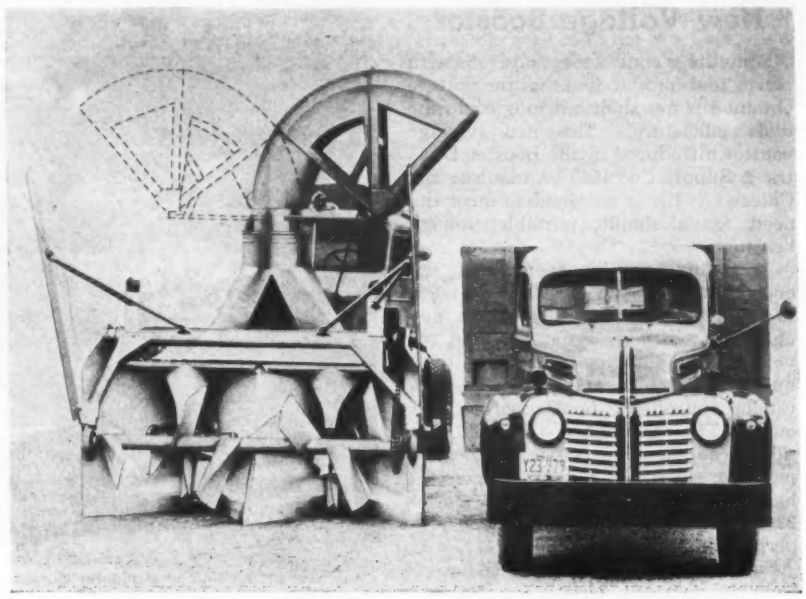
Formerly District Engineer in Texas, Harold Duncan is now Assistant Regional Manager for Eutectic Welding Alloys Corp. of New York City. He is in charge of the company's district engineers serving users of Eutectic products throughout the southwest. Eutectic offices are located and maintained at 3852 Turtle Creek Drive, Dallas, and at 1213 Capital Ave., Houston, Texas.

Telescoping Chute For Rotary Plows

A new loading and casting chute for Bros rotary snow plows has been announced by the Wm. Bros Boiler & Mfg. Co., 1057 Tenth Ave., S. E., Minneapolis 14, Minn. The new development is designed to increase the flexibility of the rotary in highway, street, and airport work.

The chute is revolving, with a 270-degree swing from side to side, so that snow can be loaded on either side of the plow. Forward casting may be used in cleaning narrow lanes where space is not available for side casting or loading. When telescoped, the chute serves as a snow caster, throwing snow in any position within a 270-degree arc. Hydraulically controlled within the cab, this new chute is available as standard or auxiliary equipment on Bros Sno-Flyr rotaries.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 74.



Bros announces this new telescoping and revolving chute for its rotary snow plows.

New Voltage Booster

Sometimes contractors start jobs with power tools only to find that the voltage obtained is not sufficient to operate the tools efficiently. The new voltage booster introduced by the Booster Electric & Supply Co., 1553 W. Madison St., Chicago 7, Ill., is designed to meet the need for a simple, portable voltage booster.

According to the company, the booster will step up most low voltages to full 110 and/or 220 volts at the machine. It will also reduce 200 and 220 volts to 110 volts if desired. A unit requiring 110 and another requiring 220 can be run off the Booster simultaneously. The operation of the booster is said to be simple, as it has no moving parts or tubes. It weighs 95 pounds, has a 5-kva capacity handling up to 22/44 amperes, and is equipped with permanently attached plugs.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 101.

The new CR Model 100 Dempster Diggster, shown here on a TD-9 crawler tractor, may be mounted on any make of tractor. It is getting ready to unload a 1-cubic-yard (heaped) bucket of hard chert after digging out a 15-foot bank.

New Crawler-Mounted Shovel for Digging

Crawler-type traction is now available on the Dempster-Diggster, according to an announcement by Dempster Bros., Inc., Knoxville, Tenn. The new hydraulic shovel and loader may be mounted on any make of tractor; it is also produced as an automotive unit on rubber-tired wheels.

The new Diggster, Type CR Model 100, features the hydraulic crowd and hoist principle of the rubber-tired loader. Four interchangeable buckets of two types are available: the 1 and 1¼-cubic-yard (heaped) digging buckets, and the 1½ and 2-cubic-yard (struck) buckets for handling loose materials. The gross weight of the unit is 21,480 pounds.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 9.

Catalogs on Clutch Plates, Facings, Brake Linings

Four new catalogs cover the complete Velvetouch line of all-metal clutch plates, facings, and brake linings for Caterpillar, Allis-Chalmers, LeTourneau, and International tractors and earth-moving equipment. The catalogs have just been released by The S. K. Wellman Co., 1374 E. 51st St., Cleveland 3, Ohio. Each covers all of the standard and replacement parts for an individual line of equipment, and is clearly indexed for easy reference. Listings include tractor model numbers, clutch and brake data, dimensions, drilling information, Velvetouch part numbers, and quantities required for replacement.

This literature may be obtained from the company, or by using the Request Card on page 16. Circle No. 32. Please state the make of tractor and earth-moving equipment you use.

Concrete Agent Used For Bridge in Phila.

It has recently been brought to our attention that Plastiment, a concrete densifier and retarder, was used in the construction of the prestressed-concrete Walnut Lane Bridge in Philadelphia, Pa. (See C. & E. M., December, 1949, pg. 52.) Composition of the concrete, which was mixed at a central plant, was as follows:

Cement (standard)	8½ sacks	799 lbs.
Fine aggregate	....	1,010 lbs.
Coarse aggregate	....	2,020 lbs.
Water	34 gals.	238 lbs.
Plastiment	¾ lb. per sack	6.4 lbs.

Under tests to destruction, one concrete girder failed in compression at approximately 7,000 psi. The average compressive strength of test cylinders taken at 28 days was 6,730 psi.

Plastiment, manufactured by Sika Chemical Corp., has several features that make it adaptable to use in prestressed construction or other high-quality concrete work. It retards set to permit continuous pouring of girders without cold joints, and allow ample time for transportation of centrally mixed concrete and proper placing and consolidation. It is also said to provide good workability even for low-slump concrete; this is essential for prestressed construction. Plastiment's densifying action produces high-strength concrete and minimizes loss of prestressing by reducing shrinkage and plastic flow. The increased workability also limits surface defects and provides better durability.

Further information concerning Plastiment may be obtained from the Sika Chemical Corp., 35 Gregory Ave., Passaic, N. J. Or use the Request Card at page 16. Circle No. 151.

"Custom" Crusher Spews Aggregate

Contractor Blends Machines To Produce 2,000-Ton-per-Shift Rig At a Low Unit Cost

✦ DURING the winter of 1948, while some of its best men had time on their hands, Strong Co. of Springville, Utah, assembled a custom crushing-screening plant. It was designed to end rock-production troubles. Plant dependability, low unit cost, and high daily production were the ends which the Strong Co. hoped to achieve.

The plant is now in operation. Not only has the rig operated without "bugs", but on the production of ¾-inch rock in hard material, the plant has consistently delivered tonnages at an average rate of 2,000 in 8 hours. Set up to deliver sub-base rock and mineral aggregate for a hot-mix plant, the crusher has been able to keep up with both operations, despite the fact that the hot plant is putting out 1,000 tons a day.

The layout of the machine features heavy-duty equipment that is portable, with individual power on the various parts of the machine to make it more flexible. The various components of the set-up are standard-stock manufactured equipment, but some of the sizes are not generally found on a crusher which is this portable.

At the time this article was written, the crusher was set up in a 10-acre pit, which Strong Co. recently purchased near Orem, Utah. The output of the machine was being used on granular sub-base and hot-mix asphaltic concrete on a 6.9-mile section of U. S. 89, which Strong was rebuilding to 4-lane standards for the Utah State Road Commission. (See article on page 29). It was expected that this pit would furnish a great deal of material locally for some time to come, even after the $375,000 contract was finished late last fall.

Flow Plan Through Plant

The pit in which the new machine was operating is an ancient lake-bed area. It is filled with sand, conglomerate, and boulders, all of which show a great deal of travel in the geological past. The rocks are very hard and abrasive, and the roll crusher had to be hard-faced with new metal about 4 hours every night.

Raw pit material was shoved direct to the trap by a Caterpillar D8-mounted bulldozer. A Model C Tournadozer was also working at this operation, on a demonstration basis, through courtesy of the J. K. Wheeler Machinery Co. of Salt Lake City. One corner of the pit was excavated beyond ground water to form a lake, which with the help of plenty of boiler feed-water compound is suitable for the generation of steam at the near-by asphalt plant.

The dozers were not allowed to push wet material into the crusher. Insofar as possible, only the parts of the pit which have been exposed for some time to wind and sun were fed to the trap. This made it necessary for the machines to cover a wide pit area, to keep the crusher supplied, but it paid off subsequently when crushed aggregate went to the asphalt-plant drier. Too much wet rock can and does reduce the output there.

The primary trap at the custom crusher contains a Pioneer 30-inch reciprocating feeder. It delivers the pit-run material to a 30-inch x 30-foot conveyor belt, driven by a 10-hp electric motor, which in turn takes it to the first screen. This is a Pioneer single-deck 4 x 10-foot sizing unit, covered with 1-inch mesh.

Material passing this 1-inch screen drops down and goes via belt conveyor to the temporary transfer hopper. Material retained on the 1-inch mesh drops into a large Universal 30 x 40 jaw crusher, driven by a Minneapolis-Moline gasoline engine. Throughs from the jaw pass immediately by conveyor belt to a Universal 24 x 40 roll crusher, driven by a Caterpillar D13000 diesel engine.

The broken rock from the roll crusher passes over a belt conveyor to a Universal single-deck shaker screen, which is situated beyond the primary scalping unit. This Universal screen is also covered with 1-inch mesh, and thus everything still over 1 inch passes back to the scalping screen, where it is again routed through the crushers. Material passing the Universal secondary screen joins the other throughs, and is routed over a stacker belt conveyor to a 50-ton surge bin.

The surge bin is a standard Blaw-Knox concrete-aggregate batcher, complete with scales and four bin compartments. The plates at the base of the compartments have been removed to simulate a single-bin stockpile. Near the top of the bin a large hole has been cut, with an overflow chute directed toward the ground near by. This permits the bin to be full at all times so trucks can haul, and the overflow which spills to the ground is pushed about 125 feet by a Caterpillar D8 dozer to the feeder trap of the asphalt plant.

The entire plant is portable, and is set up in a direct line. All electric motors scattered over the plant are

(*Concluded on next page*)

C. & E. M. Photo

This is the special crushing plant assembled by Strong Co.

"Custom" Crusher Spews Aggregate

(*Continued from preceding page*)

extra heavy-duty and their horsepower is high. An International UD-18 diesel engine with a 75-kw generator furnishes the electric power for these motors, while a Caterpillar D13000 runs the secondary crusher.

While the mineral aggregate for the hot-mix on the recent job was only a 2-bin pull, and the sub-base rock was quite similar as to size requirements, a great deal of flexibility was possible. Extra screens could be installed, the clearance on the jaw and roll crushers changed, and the feed controlled to meet pit characteristics.

Daily lubrication guards against wear, and each night a welder comes in to work for 4 hours, putting a combination of Magna-Tone N.M. and Airco 387 hard-facing rod on the roll crushers. Without this daily build-up protection, the crushers would soon cup down in the center. This impairs their efficiency. On this plant there is no thought of "getting by". They keep it in tip-top shape.

The plant was put together by plant operators, mechanics, and other key men of the Strong Co. organization. One plant operator and an oiler make up the entire crew of this unique rock-production machine. The work was done under the general supervision of Ernest A. Strong.

Line of Portable Forced-Air Heaters

A line of portable forced-air oil heaters, with outputs ranging from 168,000 to 350,000 Btu, is manufactured by The Silent Glow Oil Burner Corp., 850 Windsor St., Hartford 5, Conn. Made in five different models, these heaters are available for manual or fully automatic operation, with air delivery capacities of 550 to 2,400 cfm.

Typical uses in the construction field include: space heating of temporary buildings, buildings under construction, warehouses, storage sheds, garages, and repair shops; preheating engines, machines, and equipment; thawing frozen ground, pipes, and machinery; and drying or curing of concrete, plaster, and paint.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 152.

Masonry Treatment

A new chemical designed to waterproof and harden masonry of all types —stucco, concrete, concrete block, and brick—is now manufactured by The Reaume Co., 7330 Coldwater Canyon, North Hollywood, Calif. The company states that laboratory tests made after the application of Super Crete indicate 90 per cent less moisture absorption and an increase of over 100 per cent in hardness and compressive strength of the masonry.

Super Crete is said to make paint last longer by eliminating lime and alkali, giving a firm hard surface foundation; and to eliminate flaking and crumbling of the paint and the surface to be painted by preventing moisture from getting behind the paint and softening up the binder.

It can be brushed or sprayed on walls or floor, and is available in 1 and 5-gallon cans and 55-gallon drums. If you desire, a trained crew from the Reaume Co. will apply Super Crete for you.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 85.

Pipe Co. Has New Manager

C. Ray Wilhelm is now Southeastern Division Manager for Universal Concrete Pipe Co. He directs Universal's operations in Georgia, Tennessee, Alabama, and Florida, from division headquarters in Atlanta. Before he assumed this position, Mr. Wilhelm had charge of machinery production and sales.

New Rule Simplifies Control Calculation

A new slide rule has been developed in accordance with the basic principles of quality control adopted by the American Standards Association in the standard Z 1.3 "Controlling Quality During Production". It is made by Pickett & Eckel, Inc., 5 S. Wabash Ave., Chicago 3, Ill. In addition to the traditional log log scale arrangement familiar to engineers, this new rule has specialized quality-control scales. It also has ordinates and areas for the normal curve.

These special scales aid in the following calculations: (1) One group of scales is used to control the quality of a product in which the quality characteristic is a measurement such as a length, diameter, or eccentricity. The same principles apply to measurements of electrical characteristics or chemical processes. (2) Another group of scales is used to compare the limits that a process is actually maintaining within the specification limits. (3) One scale is used to find limits for charts for per cent defective. This calculation is perhaps the most difficult and tedious in elementary quality control. The rule handles it with one setting. (4) Scales are included to find areas and ordinates of the normal curve. This useful curve is also known to engineers as the Gaussian distribution, or the normal curve of error.

According to the company, most of the problems arising in quality control can be solved by means of this rule. Since it includes the constants needed and the values for the normal curve, it makes it unnecessary to carry a table of constants and tables of the normal curve. The duplex-type Quality Control rule is 12⅛ x 2 inches x 5/32 inch in size.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 21.

Special Wear Plates For Snow-Plow Shoes

A snow-plow shoe assembly has been announced by Ward Weller Co., 339 Auburn St., Auburndale 66, Mass. The new War-Wel assembly consists of a shoe which is bolted or welded to the plow for keeps, and a wear plate which is attached to the shoe with four ¼-inch cotter pins. This means that there is no need to discard an entire shoe when the wearing surface has worn thin. The wear plate gives 15 pounds of good tough wear before replacing, and then the driver simply pulls out the four cotter pins, installs the spare wear plate, and hits the road again. Both shoe and plate are made of Amsco manganese steel. Savings up to 40 per cent have been reported.

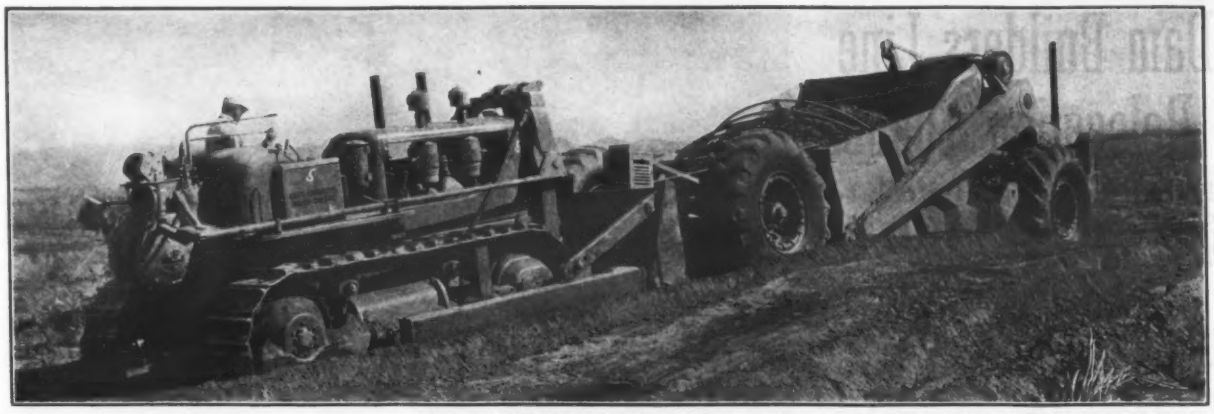
Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 142.

Hard-Surfacing Electrodes

The latest bulletin on electrodes for hard-surfacing issued by the Alloy Rods Co., of York, Pa., features the new Chrome-Boride electrode. This electrode, with an overall weld deposit hardness of 68 to 72 Rockwell C, is designed for use where exceptional hardness is desired such as hard-surfacing jaws or dipper teeth. The catalog points out that with this extreme hardness the weld metal will not respond to heat treatment nor can it be machined; finishing must be done by grinding. The Chrome-Boride electrodes operate on ac or dc, straight polarity and come in 1/8, 5/32, 3/16, and 1/4-inch sizes.

Included in the 4-page folder are data and suggested applications for Wear-Arc types 300, 500, and 600, with Rockwell C ratings of approximately 30, 50, and 60, respectively.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 55.



A new Allis-Chalmers HD-19 torque-converter crawler pushes a LeTourneau Carryall heavily loaded with sandy soil. The units are working on an extension project at the Los Angeles Airport. The movement of 12,000,000 cubic yards of dirt is involved.

Dam Builders Line Relocation Tunnel

Burlington Railroad to Skirt Boysen Reservoir Through Concrete Bore In Treacherous Rock

(Photo on page 1)

✦ CRAWLING, moving ground which gave so much trouble last year during tunnel driving at Boysen Dam has been tamed. Men have been busy installing the reinforced-concrete lining throughout the 7,200-foot railroad relocation bore. That, coupled with millions of pounds of structural steel tunnel framing, will stop the moving ground from ever again damaging the construction as it did several times while work was in progress.

Morrison-Knudsen Co., Inc., of Boise, sponsor of a 7-firm joint venture, is doing the work on a $13,900,000 contract with the U. S. Bureau of Reclamation. The tunnel work is included among other items providing generally for construction of Boysen Dam (see C. & E. M., Jan., 1949, pg. 2), the hydroelectric power plant, and relocation of the Burlington railroad to miss the reservoir.

Tunnel work has been for over a year one of the major contract items. A part of the long 13.5-mile relocation from Bonneville to Boysen, Wyo., the tunnel pierced ground which shifted its weight every time somebody stepped a little hard. Serious slides came down two or three times to damage some of the access portals. The damage was repaired, and men worked stubbornly ahead. The force of crawling rock was so great that 8-inch WF steel I-beams were put in to brace the excavation. Some went in on 12-inch centers, with bottom spreaders along the tunnel floor.

Concrete lining went on at the rate of 150 feet a week by the Pumpcrete method. When the job was visited, M-K planned to install a duplicate of the present set-up to double that capacity.

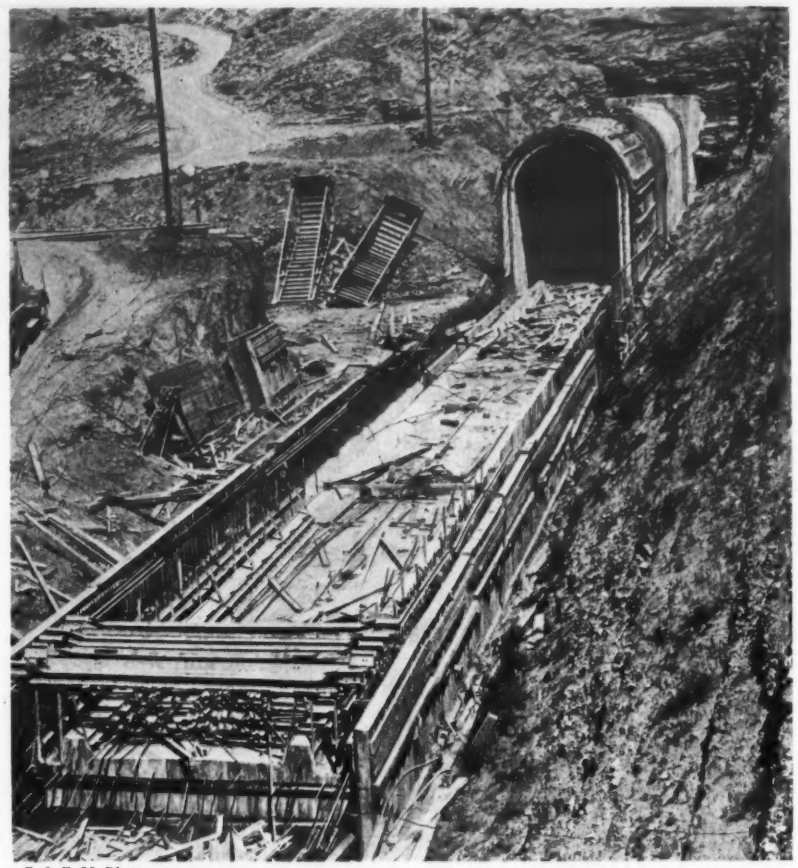
A Large Tunnel

Boysen Tunnel will accommodate the largest modern locomotives. Its single set of tracks will be 25 feet 8 inches below the concrete-lined arch ceiling, and there is 17 feet of clear space between the 38-inch-minimum reinforced-concrete walls. Raised concrete curbs, pierced at intervals by weephole pipes, will carry the track ballast. Water dropping from a train will drain through the weep holes and pass down the trench on either side of the curbs.

Occasional safety niches and motor-car set-offs through the tunnel will also permit section men to get in the clear if they are caught inside the bore when a train is due.

The long tunnel was constructed in four main parts. This was possible because the Bureau of Reclamation plans called for two cut-and-cover sections where the overburden was shallow. Morrison-Knudson also opened up another cut-and-cover section in the center of the longest length of construction. Loaded with ground water, the heading soon became known as "Woody's Well", in honor of Project Manager B. Woody Williams.

But the extra two headings at Woody's Well speeded construction work a great deal by making 8 headings available for work. It also assisted a great deal in the concrete lining work.



C. & E. M. Photo

Part of the railroad tunnel at Boysen Dam was cut-and-cover section, as shown here.

The Lining Organization

Lining work was set up to make two 75-foot pours per week with each of two sets of forms. The actual pour took about 24 hours, since there was approximately 750 cubic yards of concrete. Clean-up and preparing the forms for another pour required about 48 hours, largely because of the extensive nature of clean-up work.

The lining was placed first in the invert, or tunnel floor. At least three invert pours were ahead of the wall placing at all times. Concrete came from a central batch plant, which is mixing all the material for the dam as well. Hauled to the tunnel in agitators, it was sent to its final location by the Pumpcrete method.

Invert Pours Not Easy

Bureau of Reclamation specifications called for the tunnel floor to be cleaned down to undisturbed material prior to the pour. This caused a considerable headache, because the hard rock had to be shot rather heavily during the excavation, and to get it down to undisturbed material often required men to go from 6 to 24 inches below the neat pay lines for the invert.

A 20-man labor crew on each shift was employed to muck out this loose material. Anything which could be removed by pick and shovel was classed as "disturbed" material. The men

(Continued on next page)

loaded it out to a Koehring Dumptor, which took it outside to the disposal dump. The 75-foot-long invert sections were then cleaned with air and water jets prior to the placement of steel reinforcing.

During the first part of invert construction, however, clean-up work did not end with the first round. After the reinforcing steel was placed, it was found that men had tracked in a great deal of mud, fine particles, and so on. With two dense mats of steel reinforcing in place, it was extremely difficult to re-clean the invert pour, blowing clean all the irregular crevices and low places.

The answer to this problem was evident when General Superintendent Harold Buckert directed that all non-pay concrete, up to the neat line, be poured immediately on completion of the clean-up. This gave the steel men a better place from which to work, and speeded the work by making any extra clean-up comparatively easy.

As a rule, the invert concrete was placed several pours ahead, immediately upon completion of a barrel or arch pour. At that time the Pumpcrete delivery pipe was full of fresh concrete, and this material could be used in the invert when the line was cleaned.

Special Steel Liner Forms

Special steel liner forms, rented from Blaw-Knox Co., were used to hold the lining concrete during placement. The forms came in half sections 25 feet wide, and were used by bolting three complete sections together. Each section was designed to retract from the top by means of hydraulic jacks, and the base of the forms was also retracted from the concrete by putting a strain on steamboat ratchets near the base.

When the form was in place and lined up, it was prevented from any downward movement by heavy timber blocking. This was inserted between the bottom of the concrete invert drain trench and the heavy haunches which made up the base for the reinforcing ribs. When the form was retracted, its weight rested on steel railroad wheels, and a 5-ton pull by an air tugger was sufficient to move the heavy weight ahead.

In moving the form, a crew of about 10 men worked from 6 to 8 hours. First of all, they took a slight strain on six Blackhawk hydraulic jacks on each side, and removed the support blocking under the ribs. Then they removed the timber spreaders in the center, and took out the blocking between the form ribs and the concrete curb, which was placed there to maintain the form on exact line during the pour. The steamboat ratchets were then tightened, which pulled the base of the forms away from the concrete. The hydraulic jacks were then released, dropping the form about 2 inches from the ceiling concrete.

An Ingersoll-Rand air tugger pulled the steel form ahead 75 feet, where the process was reversed to re-set it. The back end was aligned on the previously poured concrete, while the forward end was carefully set to a center line and grade established by surveyors. The form face was checked before every pour by running a plumb line from the center point at the top to this transit-located center point in the invert. The hydraulic jacks made it easy to adjust the heavy form with a minimum of trouble, and it was set to no tolerance.

The steel form panels consisted of a 3/16-inch steel skin face, reinforced on the outside by horizontal 6-inch channel-iron stiffeners and heavy vertical open-truss ribs, set on 6-foot centers. These ribs terminated in solid haunches, which when blocked against the invert concrete and curb prevented any movement of the form during the pour. The haunches extended down into the drain trench on each side of the curb. The steel trucks which carried the form weight on railroad rails were set in the clear of the inside of the curb.

These forms were used and re-used, and it was expected that they would still be in first-class condition when tunnel lining was finished some time in December.

A special platform jumbo, made of timber, was used in conjunction with the steel forms to speed up the steel erection. This jumbo was 100 feet long, and high enough to permit men to place the steel reinforcement bars for a section of lining. It came into play the instant the invert pour has hardened. Working from this jumbo, steelworkers set the 1-inch square steel bars which went on 4-inch centers at right angles to the tunnel center line. The tie bars which extended longitudinally were ¾ inch, and they were generally at 12-inch centers. There were two steel curtains in about 400 feet of special horseshoe tunnel.

The steel work could go on from this jumbo while the adjacent lining pour was being made. At the same time, the jumbo served as a working platform for the men who handled the Pumpcrete pipe. There was absolutely no delay due to the placing of steel reinforcement, thanks to the use of these simple, rail-mounted jumbos which served each set of forms.

Pouring the Lining

The 44,000 cubic yards of Class A concrete in the tunnel lining was all placed by the same method: by a Rex 200 Double Pumpcrete machine. Using an 8-inch delivery pipe made up in sections up to 10 feet in length, the machine forced concrete to the forms, where it was deposited and vibrated.

(Concluded on next page)

Dam Builders Line Relocation Tunnel

(*Continued from preceding page*)

Concrete was batched out of a new 350-ton Noble fully automatic batcher, which is only a few months old. A serious fire on April 1 completely destroyed the Noble plant erected in 1948. The Noble batcher used sand and aggregates from the M-K crushing plant which produced all the aggregates and ballast for the railroad relocation. Monolith Types V and II Sulphate cement, furnished by the Government, were used in the mix, with enough Protex to entrain approximately 4 per cent of air.

The dry-batched ingredients were dumped to a Koehring 4-yard tilting mixer, which added water and operated 1½ minutes per batch to produce the concrete. The material was then transferred to three Rex Moto-Mixers, mounted on Euclid rock trucks. The Moto-Mixers agitated the material while it was en route to the tunnel. The big Euclids drove to the tunnel portal, backed in over the floor, and when they reached the Pumpcrete machine they backed up a ramp and discharged directly into the receiving hopper.

The usual delivery distance from the Pumpcrete layout to the pour was about 600 feet. The 8-inch delivery pipe passed over the invert, up the jumbo, and was suspended on hangers from that point, welded to the 8-inch steel arch supports. The delivery pipe was laid to the far end of the pour to start the concrete, and the end of the pipe was usually embedded in from 10 to 15 feet of concrete as the material built up. As the concrete filled up between the steel form and the blasted rock walls, the pipe was broken occasionally outside on the timber jumbo platform, a 10-foot section removed, and the pipe made up by retracting the remainder with a pull from the Ingersoll-Rand air tugger.

The concrete discharged on the steel form at the top of the arch, gradually running down the sides to fill up the walls. Eight vibrator men with Viber electric machines worked the material constantly as it was being delivered. A small amount of compressed air was also used for the last 100 feet of delivery pipe. This air bubbled up and helped to prevent segregation of the aggregates while the concrete was being placed.

The concrete crew worked deep inside the forms, in a narrow working area bordered only by the steel reinforcement and the blasted rock. It was hard, brutal work. As the concrete went along, special grout pipes were put in occasionally to fill in later those small holes and places not completely filled by the Pumpcrete method.

The top of the ceiling lining, especially, never filled completely to the roof line, for the practical reason that it tended to sag. Unless this opening was grouted, there would be a danger that seep water would collect in these pockets, and later on if any cracks developed, the tunnel lining would leak.

In an effort to forestall that possibility, M-K did a continuous pressure-grouting job, using 4 to 1, 2 to 1, and 1 to 1 cement-water mixes and a Gardner-Denver reciprocating pump to force the material in. There was also a filler mix used, especially on the ceiling void, which contained sand, cement, and water.

A jumbo also assisted the grouting operation. It was a steel affair, mounted on rubber tires which rode the concrete invert curbs. The upper grout holes were drilled out by pneumatic drills on the jumbo, mounted on column bars; wagon drills were used for the holes in the invert. The holes were filled by inserting a pressure packer pipe connected by hose to the pump. A pressure of 65 psi was usually maintained, and about the worst grout hole on the project took 1,200 sacks before it was filled. All concrete lining was cured by white Hunt Process.

Personnel

The project is being administered under the general supervision of L. N. McClellan, Chief Engineer of the Bureau of Reclamation, with Kenneth F. Vernon at Billings as Regional Director and T. L. Clark as Construction Engineer. Also on the job for the Bureau of Reclamation are G. Raymond Rolin, Project Engineer; B. G. Felkner, Field Engineer; and Ted Mann, Chief Inspector. R. H. Workinger of Cody, Wyo., is Manager of the Bureau's Big Horn District in which the Boysen Unit of the Missouri River Basin Project is located.

For Morrison-Knudsen Co., Inc., Harold Buckert was General Superintendent under Woody Williams, Project Manager, and John R. Barry, recently elected M-K's "Man of the Month", was Project Engineer. Jim Raftery was in charge of forms, and the Concrete Placing Foremen were Lloyd Hixson, Grant Ferre, and Max Graham.

Thompson-Starrett Co. Elects Two New Officers

Thompson-Starrett Co., New York City contracting firm, has advanced General Donald B. Adams from President to Chairman of the Board of Directors, and J. R. Van Raalte from Executive Vice President to President. Joseph D. McGoldrick, who has retired from the chairmanship, remains as a Director and was elected Chairman of the Executive Committee.

This is the Hobart Electro-Mizer, a start-stop switch for welding machines.

New Start-Stop Switch For Welding Machine

A new product of the Hobart Bros. Co., Hobart Square, Troy, Ohio, is the Electro-Mizer, designed to provide greater efficiency and economy in welding operations. It is a remote start-stop switch mounted on a stand, with arms providing finger-touch control. The weight of an electrode holder breaks the circuit and shuts off the welding machine.

It works like this: When you hang up the electrode holder, the switch automatically shuts off the arc-welding machine, and when you again pick up the electrode holder, it automatically starts the machine. Thus the machine runs only when welding is being done. The device can be connected to any motor-generator welder which has push-button starting. In addition to the electrode holder, it provides a convenient place for a remote-control rheostat, electrodes, chipping hammer, wire brush, etc.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 29.

Motor Grader Has New Blade Circle

Latest improvement on the No. 6 and No. 8 American motor graders is a new moldboard circle, according to an announcement by the manufacturer, American Coleman Co., 340 Woodman of the World Bldg., 14th and Farnam, Omaha, Nebr.

A large central pivot pin has been added to the circle assembly. The central location is designed to provide perfect concentricity for the circle at all times. It shortens the radius of suspension, according to the company, and provides for a more rigid mounting which enables the machine to absorb shocks against the moldboard. The new pin mounting also makes possible the installation of a power reverse mechanism for the circle, as optional equipment.

The new circle incorporates a completely new set of castings for the moldboard cylinders. A 3-inch socket replaces the 2-inch ball support and is mounted on the lower end of the piston rod. The new 3-inch ball mounting is replaceable, and the retainer caps can be adjusted for wear. The newly designed circle is not interchangeable with the present model, American says. The weight remains the same and no change is made in the 64-inch diameter.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 112.

Time-Saving Chart Lists New Social Security Rate

A new social security tax chart for calculating 1½ per cent payroll deductions with speed and accuracy is now offered by Delbridge Calculating Systems, Inc., 2502-10 Sutton Ave., St. Louis 17, Mo. The Delbridge chart covers all payrolls. A visible index makes it speedy and convenient to use.

The new 1½ per cent rate cannot be figured by visual inspection because of the decimal fractions involved. The chart gives accurate answers in half the time required to do the figuring by machine and in a third the time required to figure by hand. It is guaranteed accurate by Lloyds of London.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 140.

Steel-Mesh Bridge Decks

Open steel-mesh decking for bridges is described in a 24-page booklet prepared by Irving Subway Grating Co., Inc., 27th St. at 50th Ave., Long Island City 1, N. Y. Standard Irving decking consists of 2½ x 3/16-inch carrying bars and 1½ x 3/16-inch crimped bars, and is riveted together with ⅜-inch cold-driven rivets on 5-inch centers. The decking is regularly made of hot-rolled strip steel.

Most of Catalog F-300 is devoted to features of the open-mesh decking for bridges: its self-cleaning and self-draining characteristics without crown, good traction, continuity in all directions, light weight, durability, and the fact that it is not affected by vertical wind pressure. The booklet indicates that the major portion of an Irving decking installation consists of standard units 2 feet 6 inches wide x 25 feet long. Additional units of special dimensions necessary to complete the area are fabricated to meet requirements. Graphs and diagrams illustrate the structure of the decking, and the splicing and installation. Complete specifications for open-mesh steel decking and a table of required transverse sills for varying loads and stringer spacings is also given.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 64.

Safety-Clothing Catalog

A 32-page catalog on safety clothing is offered by the Holcomb Safety Garment Co., 128 N. Jefferson St., Chicago, Ill. It describes a full line of welders' protective clothing, abrasion and heat-resistance gloves and mittens, aprons, and other safety garments.

Catalog No. 104 may be obtained from the company, or by using the Request Card at page 16. Circle No. 104.

Here is the new collapsible warning sign developed by members of the N. Y. Department of Public Works. It is now being made by the Cataphote Co.

A New Warning Sign

A new collapsible warning sign developed for use by highway workmen was announced recently by S. T. Vosburgh, Director of the Bureau of Safety, New York State Department of Public Works. Design for the wrought-iron folding standard and sign was originated by members of the Department during the past year. Commercial development of the sign is in the hands of the Cataphote Co., Toledo 10, Ohio, the company that originally cooperated in the manufacture of the standards for holding the signs.

The standard is 26 inches long at the base with a slightly shorter inner crosspiece. The framework is 35 inches high surmounted by two 18 and 24-inch red flags set at 60-degree angles in the handle located in the center of the top of the frame. These flags are parallel with the sign insert.

One face of the sign, painted yellow, reads "Road Work Ahead" and is designed to face traffic from the right-hand shoulder from 200 to 500 feet before the point where work actually begins. The reverse side of the sign is white with black lettering saying "Work Zone Ends" to advise travelers leaving the area. The sign inserts are removable to permit a variation in the information conveyed.

Each highway construction crew of the Department has been supplied with two of the signs, and they are now in use throughout the state.

Further information may be secured from the Cataphote Co. Or use the Request Card at page 16. Circle No. 117.

New Truck Engine

A new 6-cylinder Ford truck engine with 4-speed Synchro-Silent transmission is now available as optional equipment on Series F-6 Ford trucks, according to an announcement by the Ford Division, Ford Motor Co., Dearborn, Mich. Designed for heavy hauling and high speed on grades, the new Ford Rouge 254 truck engine develops a maximum of 110 hp and a torque of 212 foot-pounds. It is the largest 6-cylinder engine produced for Ford trucks.

The engine is equipped with free valves which have a special cap design on exhaust-valve stems to permit free rotation when opening and closing. The high-lift camshaft is of heavy Ford cast alloy iron with large inserted-type replaceable bearings, gear-driven direct from the crankshaft. A precision-machined aluminum timing gear provides quiet operation and longer life, and tubular crankpins provide high strength, Ford says.

A cartridge-type oil filter, large removable oil sump, oil-bath air cleaner, and velocity-type engine governor are standard equipment. Bore and stroke is 3.5 x 4.4 inches and the compression ratio is 6.8 to 1. The 11-inch Gyro-Grip clutch multiplies grip as speed increases. Cushion disk construction is designed to reduce any tendency to grab. The clutch throwout ball bearing is pre-lubricated and sealed. The 4-speed Synchro-Silent transmission eliminates the need for double clutching. Constant-mesh helical gears in the three top speeds are of the wide contact type. Spur-type gears are used in first and reverse. Power take-off is through an SAE six-bolt opening in the right of the transmission case.

Futher information may be secured from the company. Or use the Request Card at page 16. Circle No. 18.

Kennedy Joins the PCA

G. Donald Kennedy has been appointed Consulting Engineer and Assistant to the President of the Portland Cement Association, Chicago, Ill. He served one term as State Highway Commissioner of Michigan; in 1943 he became Vice President of the Automotive Safety Foundation; and in recent years he has been a consultant to many states in the development of their long-range highway programs.

C. & E. M. Photos

Three steps in the Cobb black-top contract. An ID-9 pulls a Hough power broom over the initial surface treatment. Then an Etnyre distributor on a Mack truck shoots AC-15 asphalt—the tin strip across the pavement insures an even joint. Finally, 6B slag from a Buckeye spreader box covers the bitumen.

Coast Road Has Sand-Clay Base

Sand-Clay Base Has Good Foundation; Is Topped With Double Bituminous Surface Treatment

✦ EARLY last construction season, the Alabama Highway Department constructed 8.3 miles of black-top highway on a scenic coastal route from Gulf Shores to Alabama Point along the Gulf of Mexico. This project is designated FAS-366(1). The new road is less than 1,000 feet back from the shoreline in Baldwin County, which lies east of Mobile Bay. The fine-grained white beach sand serves for a sub-base, and supports a base course of sand-clay material that was taken from a near-by borrow pit. The black-top paving consists of a double bituminous surface treatment.

The road serves a fast-growing summer resort community along Alabama's limited strip of sea coast. The area has become a busy real-estate development dotted with beach homes and cottages. It also provides another access to Gulf State Park, which could previously only be reached by State Route 160 lying north and parallel to the new beach-front road.

This Gulf Coast section is reached by State Route 3, a north-south highway that intersects U. S. 90 about 22 miles inland and to the north. The new work runs from a point 1.6 miles west of the end of State Route 3, easterly along the coast. East of its intersection with State Route 3 there was a 2-mile stretch already paved which served a bathing casino of Gulf State Park. This isolated strip was connected with the paralleling road to the north. East of this section the coastal highway continues for 5 miles, making the total length of the contract 8.3 miles.

Sand-Clay Base Course

Work on the project got under way in November, 1948, when maintenance crews of the Alabama Highway Department graded the right-of-way and grubbed out whatever vegetation was growing in the sand. The alignment crossed several small lakes and ponds, shallow, marshy bodies of water, which were filled in with sand. Outside of these spots, the average cut and fill varied from 2 to 3 feet as the sand dunes were leveled and the intervening hollows filled in.

Then the state awarded a base and paving contract to the W. L. Cobb Construction Co. of Montgomery, Ala., on its low bid of $115,318. Work started on January 14 and was completed May 21. The pavement is 22 feet wide flanked by 4-foot shoulders. The base course extends out through the shoulders for the full 30-foot width of roadbed, and is 8 inches thick compacted.

Sand-clay for the base course was obtained from a borrow pit in Gulf State Park located 3½ miles north of the intersection of the new road with State Route 3. A Bucyrus-Erie dragline with a 30-foot boom and a Hendrix 1-yard bucket opened up the pit to a maximum depth of 6 feet, and loaded the material to a fleet of up to 25 trucks which hauled it to the road. Hauling was done by Ray Middleton of Aliceville, Ala., who used 5-yard trucks of assorted makes.

Ground water is high in this low

(Continued on next page)

Coast Road Has Sand-Clay Base

(*Continued from preceding page*)

coastal land, and the 10-acre pit was always inundated. A 6-inch and a 3-inch pump worked constantly to keep the water down so that the excavation could proceed. Care was taken so that the loading was not done under water, otherwise some of the valuable clay binding material would have been lost.

Bitumen Prime

A Caterpillar D7 push tractor was kept in the pit to help the loaded trucks get started in the soft, wet going. Two other tractor-dozers—an International TD-18 and an Allis Chalmers HD-7—were on the road. One pushed the trucks when necessary, and the other leveled off the dumped material. An average of 1,000 cubic yards of base course was laid in a 10-hour day. The sand-clay was laid in a single 8-inch lift, with the trucks backing out over the dumped material so as not to get stuck in the soft beach sand.

By April 7 all the base-course material had been hauled out and spread over the roadbed. Then the top 4 inches of the sand-clay, which contained some topsoil from the overburden of the pit, was thoroughly mixed over the center 26 feet of roadbed. Two motor graders —Caterpillar No. 12 and No. 112—scarified the base to a 4-inch depth, and bladed the material back and forth across the road to insure proper mixing. This operation was followed by a disk pulled by an International ID-9 rubber-tired tractor.

As the base material was mixed, the motor graders shaped it to a 3-inch crown. Water was added when necessary from two 1,000-gallon tank trucks with spraybars at the rear. They were filled from fresh-water lagoons within a short distance of the road. Despite the original wetness of the material, the warm southern sun and the mixing process removed the moisture in a short time. The shaping also included compaction by rubber-tired rollers which were pulled by ID-19 tractors.

The completed base course was then primed with MC-1 cutback asphalt, applied at the rate of 0.2 gallon to the square yard by an Etnyre 1,280-gallon distributor mounted on a Mack truck. Bitumen for the job was supplied by the Standard Oil Co. of Louisiana at Baton Rouge, La., and was shipped in tank cars to a siding of the Louisville & Nashvile Railroad at Foley, Ala., 11 miles north of the project. There it was heated and pumped into the distributor by a Cleaver-Brooks tank-car heater. The prime was shot between 180 and 200 degrees F to a 23-foot width, or 1 foot more than the pavement mat itself. The extra 6 inches on each side is to prevent raveling.

Double Bituminous Pavement

The cutback prime penetrated the base course an average ¼ inch. It was permitted to cure out for 3 or 4 days before the first application of the double bituminous surface treatment was laid down as a pavement. Before the first shot was applied, the base was swept thoroughly by a Hough power broom pulled by an ID-9 tractor. After the first application of the double treatments was completed and the slag thoroughly stuck, the surface was carefully swept again before more bitumen was applied. This was done to remove the excess aggregate and also the fine beach sand which was constantly blowing across the pavement. The presence of sand would affect the bonding of the paving materials. This problem of blowing and drifting sand was responsible for shooting a somewhat higher concentration of bitumen in the surface treatments than is normally employed.

For the first application, from 0.40 to 0.43 gallon of AC-15 asphalt was applied to the square yard at a temperature range of 325 to 350 degrees F. This initial shot was at once covered with 4B slag, spread at the rate of 0.5 cubic foot to the square yard. After this initial layer was well broomed to remove any loose slag and any drifting sand, a second shot of AC-15 was applied at the rate of 0.41 to 0.44 gallon to the square yard at 325 to 350 degrees F. The bitumen was covered with 6B slag—0.27 cubic foot to the square yard.

At the start of an asphalt shot, two sections of tin, 3 feet wide, were laid across the pavement for the full width. The asphalt from the 22-foot spraybar at the rear of the distributor hit this first; thus an even joint was assured, and no excess bitumen was deposited before the truck got rolling.

Slag Cover

Slag for the cover coats was supplied by the Birmingham Slag Co. of Ensley, Ala., and was shipped in hopper-bottom cars to the L&N siding at Foley where it was unloaded by a Burch conveyor, 24 inches wide and 25 feet long, which had one end in a pit under the siding track. The contractor used a fleet of 9 Ford trucks, built up to hold 6 yards each, for hauling the slag to the job. The conveyor unloaded the material directly into the trucks, and it was laid on the bitumen through an 11-foot-wide Buckeye spreader box hooked to the rear of the trucks. The cover was applied in two 11-foot lanes.

Each course was rolled first by a Galion portable 3-ton tandem steel-wheel roller, and then by the rubber-tire roller which simulated the movement of traffic. The distributor usually ran out a 960-foot section which was at once covered with slag and rolled. Four of the 6-yard trucks sufficed to lay cover stone for the full-width pavement of a section this long.

The gradation of the 4B and 6B slags was as follows:

Sieve Size	Per Cent Passing	
	4B Slag	6B Slag
1¼-inch	100	....
1-inch	90–100	....
¾-inch	20–60	100
½-inch	0–10	90–100
⅜-inch	....	40–80
No. 4	0–2	0–25
No. 10	....	0–6

With the paving completed, the 4-foot shoulders were shaped up at the

(*Concluded on next page*)

slope rate of ½ inch to the foot. From the shoulders the front slopes drop off on a 4 to 1 to a ditch with a minimum width of 3 feet, and from 1 to 3 feet deep. The backslopes vary from 1 to 1 to 10 to 1.

The shoulders were sprigged with Bermuda grass set out in 1-foot rows, using 1,000 pounds of 6-8-4 fertilizer per acre.

Quantities and Personnel

The major items in this 8.3-mile Federal-Aid secondary road project included the following:

Sand-clay base course	63,500 cu. yds.
Double bituminous surface treatment	133,200 sq. yds.
Sprigging	46,000 sq. yds.

An average force of 30 men was employed on the contract by the W. L. Cobb Construction Co. under the direction of Roscoe Bozeman, Superintendent.

For the Alabama Highway Department, Dan C. Collins was Project Engineer. The Department is headed by Ward W. McFarland, Director. Marvin Taylor is Construction Engineer.

New Drawing Board; Honeycomb Structure

A new lightweight drawing board of air-cell type of construction is announced by Cal-Pan Corp., 1111 S. Fremont Ave., Alhambra, Calif. Its honeycomb or air-cell type of core design cuts weight, making the board easier to use, handle, and carry. The combination plywood top and bottom panels, framework, and honeycomb, with wood grain running in different directions, makes for strong panel design. All elements are bonded into one rigid unit with waterproof glue. The entire board is dipped in a waterproofing agent to seal in and preserve the honeycomb construction.

A straight-edge gear-rack aligner provides horizontal alignment of the plastic, removable straight-edges. An envelope type of carrying case made of water-resistant vinyl-coated fabric may be obtained as optional equipment. The boards are made in sizes from 12 x 17 to 31 x 42 inches.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 111.

The York rake, drawn by a grader, tractor, or truck, screens and distributes the windrow left by the grader blade, shunting large stones to the side of the road and leaving a well graded surface.

New Rake Attachment

A new rake attachment engineered for use behind a power or drawn grader, light tractor, or truck, is designed to speed up work and save time and labor on road finishing. This rake, manufactured by the York Modern Corp., Unadilla, N. Y., screens and distributes the windrow left by the grader blade, shunting the larger stones and other objectionable material to the side of the road, and leaving a well graded driving surface. The unit is applicable for roadside improvement and landscaping, leveling, raking stone, and preparing seedbeds.

The rake has an overall length of 15 feet 4 inches and a working width of 9 feet 4 inches with the rear section of the rake extended. The frame is constructed of electrically welded structural steel. The rake itself is composed of 66 alloy-steel heat-treated teeth attached to high-carbon spring-steel heads. The teeth are 5/16 x 1¼ x 28 inches. Rake lift is accomplished by a hydraulic hand pump with a single-acting cylinder. Pole hitch is adjustable in height.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 14.

Centrifugal-Pump Catalog

A 20-page color catalog describing a complete line of automatic centrifugal pumps has recently been offered by the Barnes Mfg. Co., Mansfield, Ohio. The company's line includes 15 different models with capacities ranging from 3,000 to 90,000 gph. Charts listing capacities in gpm for any total head are given, along with complete specifications, descriptions, and illustrations of each of these pumps.

The engineering features incorporated in Barnes automatic centrifugal pumps are highlighted in the booklet. It points out that there are only two actual wearing parts to the Barnes Superseal and these surfaces are case-hardened, precision-ground and polished, resulting in a simple positive seal. The pumps are designed so that the suction is direct-in-line with the impeller, providing less friction loss and more ease in handling the suction hose. All Barnes impellers are adjustable to compensate for wear. The Peri-Prime incorporates a new free-passage vent located adjacent to the periphery of the impeller. This is designed to prevent clogging. Methods of selecting particular pumps to do particular jobs are simplified by handy reference tables in the back of the catalog.

This literature may be obtained from the company, or use the Request Card bound in at page 16. Circle No. 24.

Succeeds Cotton Institute

The Cotton-Textile Institute, formerly located at 271 Church St., New York City, was liquidated last September and has been succeeded by the American Cotton Manufacturers Institute at 203-A Liberty Life Bldg., Charlotte 2, N. C. New York office of the American Cotton Manufacturers Institute, Inc., will be at 271 Church St.

A cable-activated electrically controlled bulldozer blade is now available for the Model D Roadster Tournapull scraper.

A Bulldozing Blade For Use on Scraper

A bulldozer blade for attachment to the Model D Roadster Tournapull has recently been announced by R. G. LeTourneau, Inc., Peoria, Ill. The cable-activated dozer blade is suspended in front of the Tournapull, and is electrically controlled by a switch mounted on the dash control panel. The blade has a bowl length of 6 feet 8¾ inches. Height of blade and bowl is 32½ inches. Its cutting edge is reversible, has hard-surfaced replaceable tips, and can be raised 3 feet above the ground.

Equipped with bulldozer, the D Roadster Tournapull scraper can be used either as a dozer or scraper. Since all tools are on one rig, no time is consumed in changing from dozer to scraper operation, the manufacturer points out. It also can push-load other D's in fleet operation, and can be driven under its own power over the highway between scattered jobs.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 119.

New Conduit Bender For Thin-Wall Pipe

A new hydraulic remotely controlled thin-wall conduit bender for 1¼, 1½, and 2-inch conduit sizes has been added to the line of Porto-Power pipe benders made by Blackhawk Mfg. Co., Milwaukee 1, Wis. The new bender is known as the Model S-34 and consists of the 10-ton S-71 hydraulic unit and the S-35 assortment of attachments.

Blackhawk says its benders offer these major features: remote control which enables the operator to work safely at a distance and sight the bending progress from any convenient spot; all-directional operation which prevents air-binding in the bending unit and enables the operator to use the bending frame in a vertical, horizontal, or elevated position; and extra utility when the hydraulic unit is detached from the bending frame and used with standard maintenance attachments as a general-use jack.

The electrically driven hydraulic P-182 pump, which powers Blackhawk pipe benders, operates any hydraulic system up to 10,000 psi, according to the company.

Further information on this new product may be secured from the company. Or use the Request Card at page 16. Circle No. 106.

An Aggregate Log Washer

Steel log washers designed to remove tough clay and soft rock from sand, gravel, rock, and ores are the subject of a new 8-page illustrated bulletin issued by the McLanahan & Stone Corp., Hollidaysburg, Pa. They remove as high as 85 to 90 per cent of the toughest kinds of clay without damage to the material being washed, according to the folder.

Each log is constructed of two to four heavy structural-steel angles braced inside and welded full length. This construction, the catalog explains, provides maximum horizontal as well as girder strength through any axis, and prevents twisting. The washer box is square to make scrubbing easier and protect the material being washed. All foreign particles are carried off with the waste water through an adjustable overflow spout at the rear of the washer box.

McLanahan log washers are custom-built for all installations and can be furnished in all sizes and with variable speeds of operation. Log capacities range from 25 to 200 tons per hour, and log speeds from 12 to 50 rpm. The size of feed can vary from fines up to aggregate 4 inches square.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 26.

Book on Steel Buildings

A third edition of "Design of Steel Buildings" by Harold D. Hauf, new editor of *Architectural Record* and formerly Professor of Architectural Engineering at Yale University, and Henry A. Pfisterer, Associate Professor of Architectural Engineering, Yale University, has recently been published.

The book presents the general principles of structural design as applied to common types of buildings. The authors first review the fundamentals of design theory; then discuss practical design methods. This approach makes the book valuable to two groups: young architects and engineers, and experienced architects and engineers who have worked in other fields of construction and need a quick review on practical methods of building design.

The book has been revised to conform to the 1946 revision of the AISC specifications. A new chapter on welded construction has been added, and the chapter on the design of beams has been rewritten and more detailed safe-load tables included. The chapter on building design projects has been brought up to date. Here the authors present the design of the structural framework and a set of working drawings for a small business building.

Copies of this book may be obtained from John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. Price: $5.00.

Peters Changes Address

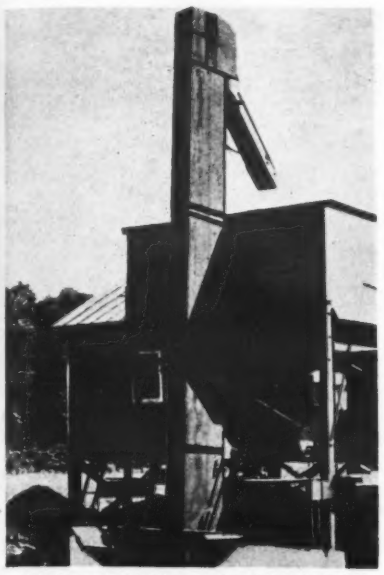
The offices of the Paul C. Peters Co., general contractor, are now located in Room 27, Kenton Bldg., 2318 Monroe St., Toledo 2, Ohio. The former address was 3656 Torrance Drive.

A General Bronze Co. man drills hard concrete with a ¾-inch Thunderbolt bit on a Black & Decker hammer to lash down a channel iron at the new Boston Airport.

Carbide Hammer Bit

A newly designed carbide-tipped hammer bit called the Thunderbolt has been announced by New England Carbide Tool Co., Inc., 60 Brookline St., Cambridge 39, Mass. This bit, developed to drill hard concrete and granite, can be used in any type of electric or pneumatic chipping hammer, the company says. It is available in sizes from 3/16 to 1 inch inclusive. Suitable chucks that fit the drill and also any make of hammer are now offered.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 10.



CMC's new totally enclosed bucket elevator is controlled from ground level and has a self-centering chute.

New Bucket Elevator For Batching Plants

A new totally enclosed bucket elevator for use with any type of Bin-Batcher, for elevating either cement or aggregates, is now offered by the Construction Machinery Sales Co., Waterloo, Iowa. This elevator is completely controlled from ground level, and the self-centering chute automatically extends when feeding either end bin, the company says.

The elevator has a 1-cubic-yard hopper capacity and is regularly made for standard two or three-compartment Bin-Batchers. With installation of any specified center section, extensions can be made to fit bins with extended sides as pictured. To facilitate ground-level loading directly from dump truck into the hopper, the bin must be mounted at least 2 feet higher than loading level to provide an adequate ramp extension. The elevator may be powered by a 5-hp electric gear-head motor or by a gasoline engine.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 88.

Highway Guardrail Protects Buildings

A steel beam-type highway guardrail has recently been adapted as a protective railing for buildings adjoining places where congested traffic or heavy hauling is likely to cause building damage. Made by United Steel Fabricators, Inc., Wooster, Ohio, USF Barrier Beam is a deep steel guardrail which is taper-corrugated longitudinally to form a section with a face approximately 12 inches wide and 3 inches deep. This section depth plus the 7-inch steel mounting frame provides a minimum clearance of 10 inches from a building wall—considered ample for deflecting impact without damage to the building.

With USF Barrier Beam two bolts are used to secure the steel mounting to the building, and a single bolt is needed to attach the beam to the mounting. No fabrication on the job is necessary since the beams are manufactured in easy-to-handle 13-foot lengths with slotted mounting holes every 7½ inches.

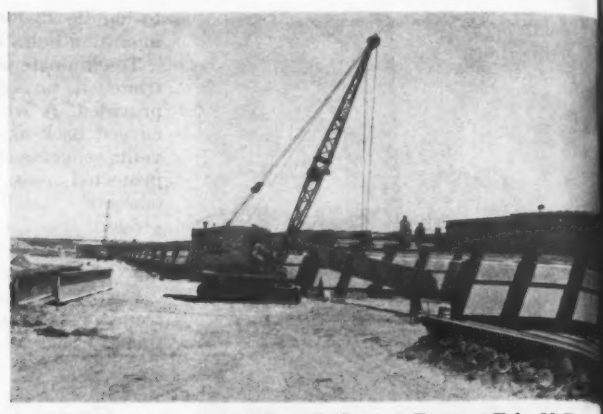
To eliminate possible injury to pedestrians, a turned-edge "safety-top" is provided. A wide flared end terminal curved back against the building prevents snagging at the entrance of beam-protected areas. The manufacturer recommends installation 19 inches above ground level, a height calculated to give protection for the buildings without damage to vehicles.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 72.

Carter Executive Dies

John W. Van Atta, Executive Vice President and General Manager of the Ralph B. Carter Pump Co., of Hackensack, N. J., died recently. He was also a director of the Water & Sewage Manufacturers Association and a member of the Pennsylvania Water Works Association.

1. A truck-mounted Bucyrus-Erie crane unloads a Fruehauf trailer carrying steel parts for two new bridges over the Pecos River. J. H. Ryan pushed the $740,000 job to completion in 14 months for the New Mexico State Highway Department. Both bridges consist of reinforced-concrete piers, bearing piles, structural-steel girders, and reinforced-concrete decks.



2. and 3. In the photo at left, and above, a Bucyrus-Erie 22-B crane raises an I-beam 36 inches deep into position on one of the bridges. Virginia Bridge Co. shipped the steel to a spur 2½ miles from the job. There a P&H crane unloaded members, and Mack-drawn trailers trucked them out to the job where they were placed directly or spotted at their bent.

Fast-Moving Gang Sets Bridge Steel

C. & E. M. Camera Catches J. H. Ryan Crew in Action on $740,000 New Mexico Job

By RAYMOND P. DAY,
Western Editor

✦ TWENTY miles east of Roswell, N. Mex., on U. S. 70, the Pecos River has been crossed by two new steel and concrete bridges. J. H. Ryan of Albuquerque pushed the job to completion in 14 months for the New Mexico State Highway Department. The $740,000 contract included both bridges and short earth approaches.

Both structures are similar. The longer is 1,192 feet from abutment to abutment; the other is 340 feet. Designed for H-20 S44 loading, both bridges have reinforced-concrete piers, bearing piles, structural-steel girders, and a reinforced-concrete deck.

While the Pecos River was diverted by dikes, wellpoints dewatered sites for 20 concrete piers on alternating centers of 67 feet 3 inches and 74 feet 10 inches. Pile driving followed, then concrete work for the 4 abutments and the piers. A black waterproofing asphalt membrane protects the concrete piers against the action of ground sulphates. Steel erection followed, and finally, deck concrete was placed by Pumpcrete. Deck slabs are 7 inches thick and 26 feet wide curb to curb, with 18-inch walkways on either side near the structural-steel guardrail.

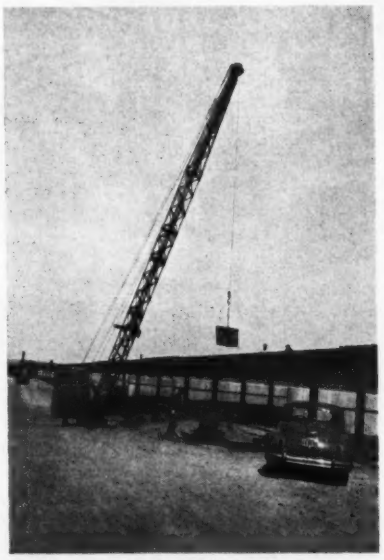
Steel Erection

But back to the steel, since this is primarily a story of how it was erected.

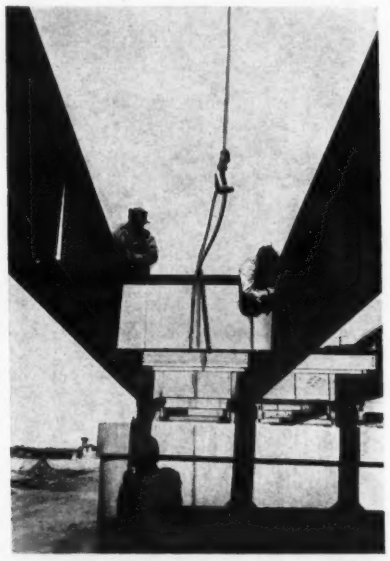
C. & E. M. Photos

4. To raise one of the 17,500-pound long girders, a special steel grab clamp is hooked under the flanges by a couple of ground men.

5. With the aid of a little crowbar prying, the girder holes line up with the hanger straps so one of the top men can slide a machined steel pin through.



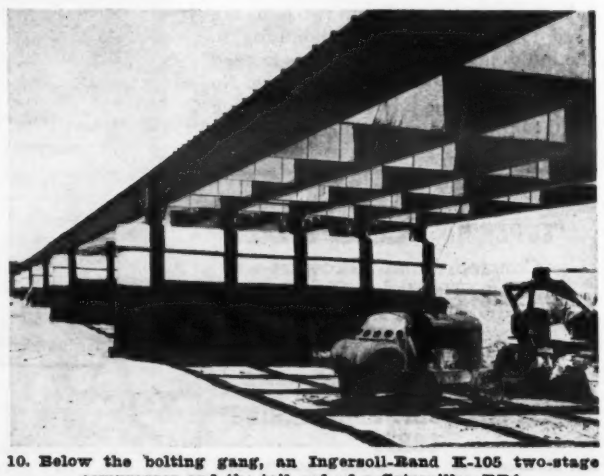
6. Then a Bucyrus-Erie 19-B crane sets structural steel diaphragms and short structural sections between the girders for safety.



7. As the diaphragms are set in, temporary pins or bolts are put through the drilled holes to hold them for a few hours until they can be permanently bolted.

8. Men follow quickly, machine-bolting every other hole.

9. Then the nuts are tightened with pneumatic wrenches. The bolts remained in place until rivets were driven.



10. Below the bolting gang, an Ingersoll-Rand K-105 two-stage compressor and the tail end of a Caterpillar RD4.

Girder members 85 feet 3 inches long rest on steel rocker shoes on top of the concrete piers. Suspended members 56 feet 10 inches long, hung by 4-inch steel pins, can move as the deck slab expands or contracts.

Virginia Bridge Co. of Memphis furnished the structural steel, shipping it via the Santa Fe railroad to a spur 2½ miles from the job. There a P&H crane unloaded it, and Mack-drawn Fruehauf trailers hauled it out to the job. At the site a truck-mounted Bucyrus-Erie crane did some of the unloading (Photo 1), but wherever possible, placing cranes helped unload and placed the steel directly on the bridge.

Before the main members were erected, the pier concrete was ground down about ¼ inch to precise elevation. A lead plate and a masonry plate and rocker assembly were installed. Then the longer I-beams for alternate piers were set in, resting on the rocker plates. With the long sections in place, five of the shorter pieces were picked up and filled in between—each hung on a pin and strap assembly at the ends of the long members.

A Bucyrus-Erie 22-B crawler crane using a four-part hoist line handled the 36-inch-deep I-beams (Photos 2 and 3). A special steel grab clamp was devised to catch under the flanges of the 17,500-pound long member. Two ground men hooked it up (Photo 4). When the beam was raised, they held the ends steady with manila ropes and a steel hook in each end of the girder.

With a little prying with a crowbar (Photo 5) the girder holes lined up with the hanger straps, and one of the top men slid a machined steel pin through. A heavy cotter key held it secure. Because of a difference in steel thickness between inside and outside members, some of the pins were short, the others long. The men checked carefully to make sure they didn't get a long pin in a short hole.

A Bucyrus-Erie 19-B crane with a boom long enough to reach over the bridge moved in next (Photo 6). It set structural-steel diaphragms and other structural sections in place between the

(*Concluded on next page*)

C. & E. M. Photo
Ryan's General Superintendent George D. Young (right) talks business with N. R. Sack, Resident Engineer.

C. & E. M. Photo
The new 1,192-foot bridge was opened to traffic last July. Though the Pecos River meanders peacefully here, it can become a raging giant.

girders as a safety measure, working very close behind the main-member gang. Hard winds blew steel pieces all over the place. Nevertheless, work went ahead rapidly. As the diaphragms were set in, temporary pins or bolts were put through the drilled holes (Photo 7) to hold them up for a few hours.

Men followed quickly with machine bolts, tightening the nuts with pneumatic impact wrenches powered by an Ingersoll-Rand K-105 two-stage air compressor underneath the bridge (Photos 8, 9, 10). Usually, bolts went into every other hole, remaining in place until rivets were driven in the open holes. Then the bolts were removed and those holes also riveted.

The crew pictured set up the main members for five spans during the day the job was visited. They followed through the next day with steel diaphragms and stiffener members.

Personnel

This kind of work is old stuff to Ryan's General Superintendent George D. Young. He has ramrodded company bridge spreads since 1936, with a brief time out in the Army.

N. R. Sack was Resident Engineer for the New Mexico State Highway Department.

Protective Coating Gives Dual Service

A new protective coating made by The Thomas Co., 1645 Hennepin Ave., Minneapolis 3, Minn., renders dual service. Designed for use on equipment and machinery in concrete and snow-removal operations, Powerfilm acts as a rust and corrosion inhibitor, according to the company, and at the same time offers a smooth glasslike surface to prevent adherence of concrete, snow, or other materials to metal surfaces.

The most recent improvent in Powerfilm is its water-displacement property. Wiped on a wet metal surface, it will displace the water and bind tight to the surface, Thomas says. This makes it particularly adaptable for use on snow-plow moldboards to give a smooth surface for running snow and a protective coating against the pitting action of chlorides. For the same reasons it aids cleaning and maintenance of concrete equipment.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 8.

W. R. Young Now Heads Steel Fabricating Firm

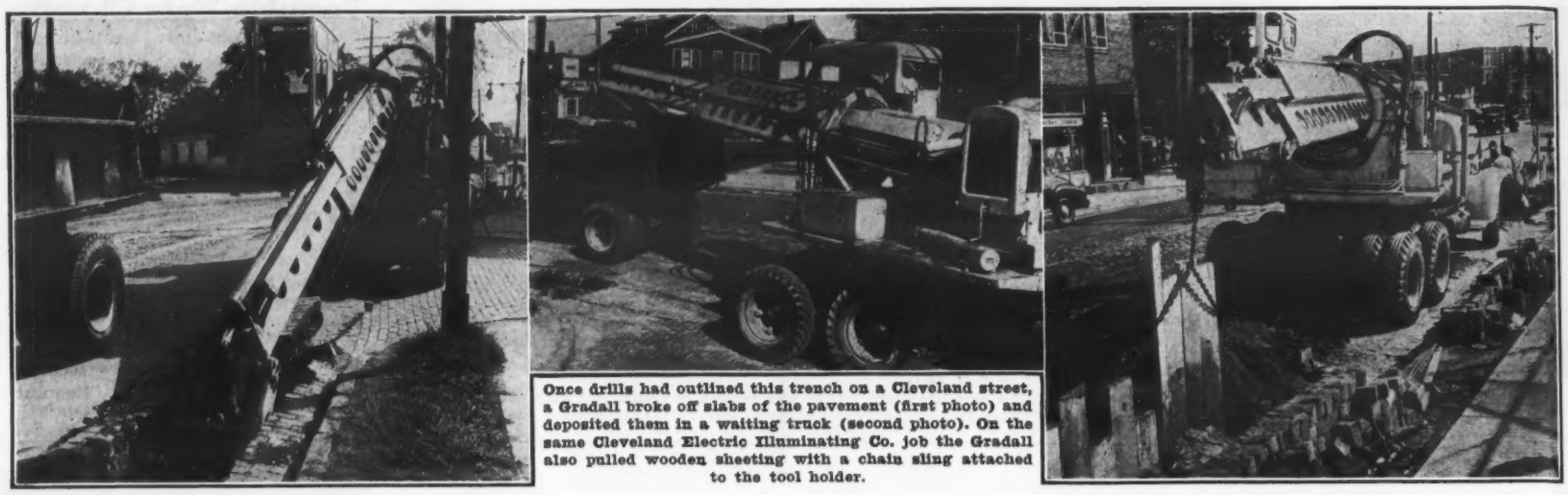
Walker R. Young, formerly Chief Engineer of the U. S. Bureau of Reclamation, has been chosen President and Treasurer of Thompson Pipe & Steel Co., Denver manufacturer of water mains, culverts, and other fabricated steel products. Gairald H. Garrett was named Vice President and Joseph Lyman Brown was appointed Secretary of the company.

Mr. Young left the Reclamation Bureau in June, 1948, after 37 years of service.

Variable Hose Clamp

A single multi-duty wrap-around clamp designed to fit all hose up to 3½-inch outside diameter is made by Ideal Clamp Mfg. Co., Inc., 435 Liberty Ave., Brooklyn, N. Y. Of a one-piece design, the clamp may be installed without removing the hose. The clamp is made of a flexible galvanized steel, and a cadmium-plated screw sets the clamp to the desired diameter. The company states that the clamp is leak-proof, originally developed for aircraft use, and will hold fast under severe vibration. The flexible band will conform snugly to any shape.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 79.



Once drills had outlined this trench on a Cleveland street, a Gradall broke off slabs of the pavement (first photo) and deposited them in a waiting truck (second photo). On the same Cleveland Electric Illuminating Co. job the Gradall also pulled wooden sheeting with a chain sling attached to the tool holder.

Pavement Removal Is Mechanized; Cost Cut

A mechanized pavement removal system devised by the Cleveland Electric Illuminating Co. has cut costs 85 per cent, reduced traffic disturbance to a minimum, and is speeding the utility's program of underground electrical subway construction.

Jackhammers and manual labor are dispensed with in the new system. First unit to go to work is a special line-drilling machine consisting of 6 pneumatic rock drills mounted on a tractor and supplied by a trailing 600-cfm diesel-driven air compressor. This rig moves forward in steps of about 4 inches, drilling the pavement with holes, six at a time, on 1-foot centers. Another line of holes outlines trenches to be excavated, and an air-driven broaching machine cuts through the web between holes and completely severs the slab to be removed.

Then an all-hydraulic Gradall straddles the trench line and lowers a bucket of trench width on the end of its 24-foot retractable boom. When the bucket has broken off and lifted a sizable length of the slab, it is rotated upward to clamp the slab against the boom, and swung over a waiting truck to deposit its load. Slab lengths up to 15 feet are handled without damage to adjoining pavement.

Once the pavement is removed, the Gradall also excavates earth to the desired depth. And as its final chore on the job, it removes wooden sheeting, three or more planks at a time, with a chain sling attached to its boom.

Boosts Voltage

A new voltage booster designed to correct low voltage conditions for portable equipment up to 5 hp is announced by the American Floor Surfacing Machine Co., Toledo 4, Ohio.

The use of this voltage transformer, the company says, boosts low voltages to a full 115 or 230 volts. It is not necessary to make a special hook-up for either of the voltages. All that is necessary is to hook the transformer on to the regular power source or meter and check the voltage input. Two plugs, 115 and 230 volts, are available to match the voltage of the motor. The unit is air-cooled and has overall dimensions of 7¼ x 8 x 11 inches.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 96.

Lists Trends in Concrete

The latest thinking of state highway departments on concrete pavement practices is presented in a report of the American Road Builders' Association Committee on Concrete Pavement Design. Issued as ARBA Technical Bulletin No. 163, the 122-page booklet covers subgrade soil practices, concrete materials, proportioning, placing, finishing and curing, and structural features of concrete pavements.

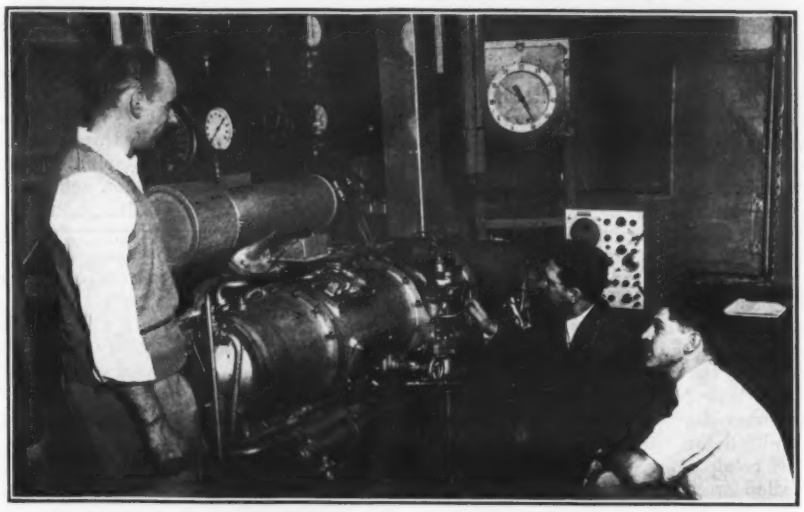
The new booklet is the result of extensive study of state practices by the committee, a member of which personally supervised each subject. It also contains comments by committee members on the trends revealed by the tabulated results. Copies are available to ARBA members on request, and are sold to others at $1.00 each. Write to the Association at the International Bldg., Washington 4, D. C.

Free-Piston Engine Tested at Stanford

A new type of auto or truck engine, using hot gases to turn a turbine, may be the outgrowth of tests under way at Stanford University on a German-developed Junkers free-piston diesel compressor. The unit was formerly used in a German submarine to launch torpedoes and was given to Stanford for study by the U. S. Bureau of Ships.

This crankless engine runs well on low-grade oil, and can theoretically be made in any size from an auto engine up to the largest diesel. It is reported to be light, inexpensive to build, operate, and maintain, and so free of vibration that a coin can be balanced on the edge of it while it is in operation.

Stanford tests have confirmed German claims that the compressor would take 70 cfm of free air and compress it to 3,000 psi of compressed air. As a prime mover, such an engine would produce hot exhaust gases—roughly at a pressure of 100 psi—to drive a turbine which, in turn, would drive a shaft.



This German-developed Junkers free-piston diesel may offer engineering answers to the problem of how to develop a turbine engine for automobiles or trucks. The model pictured here in a Stanford University laboratory is an air compressor, but the engine can also be designed as a power gas generator for a turbine. (Left to right) Capt. W. E. Rafert, Army ordnance; A. L. London, Stanford professor of mechanical engineering; and William H. Chamberlain examine the crankless engine.

The Stanford work, sponsored by the Office of Naval Research, seeks to analyze the thermodynamic and dynamic design aspects of free-piston systems applied both to air compressors and to prime movers. Curiously enough, the free-piston engine was invented some 20 years ago by a Frenchman named Rault de Pescara. But recent interest in it was inspired by both German and French successes in making use of the engine.

Centrifugal Pumps For Sand and Gravel

Three types of 6-inch Tell-Tale centrifugal sand and gravel pumps are manufactured by Pekor Iron Works, 9th St. at Central, Columbus, Ga. The two heavy-duty models, one with bronze bearings and the other with ball bearings, are said to supply more than 35 cubic yards of aggregate per hour, depending upon the amount of power available, speed, total head pressure, operator's efficiency, and local conditions. The standard model, with bronze bearings, is designed to produce 30 cubic yards per hour.

Exclusive feature of these pumps, Pekor says, is the "tell-tale" sign of liner wear. When the abrasive action of the sand and gravel being pumped finally cuts through the tough shell liner (and a few minutes later through the flax packing which forms an air-tight joint between the halves of the shell) there is immediately a "tell-tale" hiss of air being sucked into the shell liner. This entry of air into the liner causes the pump to lose its prime and at once stop pumping aggregate. The renewable liner may then be replaced, and the cost of the more expensive shell saved. The liners are made of a close-grained iron, manganese, and steel alloy.

Tell-Tale centrifugal sand and gravel pumps are also made in 4 and 8-inch sizes, with both bronze and ball bearings.

Further information may be secured from the company by requesting its Bulletin No. 6. Or use the Request Card at page 16 and circle No. 105.

Puncture-Producing Metal Removed from Ky. Roads

A 5-ton magnet mounted on a large truck has been patrolling Kentucky highways since last July. In a little over three months it picked up 5,672 pounds of puncture-producing scrap metal on 3,759 miles of roads—an average of 1.5 pounds per mile, and 100 possible punctures per pound.

Bent nails, bolts, screws, baling wire, spikes, and metal beer cans figured large in the debris. The Kentucky Department of Highways will keep the magnet on duty on all state roads throughout the year, except during periods of ice and snow.

Highway Construction Uses Plenty of Steel

Whatever road-steel products you need—reinforcing bars, structural steel, pipe, bar mats, mesh, dowel units, wire rope, highway guards and posts, steel piling, etc.—you will find listed in the new booklet titled "Steel for Highways" issued by the Bethlehem Steel Co., Bethlehem, Pa. The various steel products are covered under the headings right-of-way, highway bridges, bridge foundations, paving, and highway guards and posts. Fully illustrated with on-the-job photographs, the catalog includes specifications and descriptions of all the steel products made by the company.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 60.

Novo Engine Co. makes this new double-diaphragm pump. Skid and steel-wheel mountings are also available.

A Double-Diaphragm Water Suction Pump

Manufacture of 3 and 4-inch double-diaphragm pumps which can handle a variety of dewatering operations has recently been announced by the Novo Engine Co., 702 Porter St., Lansing, Mich. Like the single-diaphragm pump, the new models will handle mud, sand, or debris-laden water. But continual flow and doubled capacity are provided by the two diaphragms; one is always pumping while the other is discharging.

The 3-inch model is powered by a 2½-hp and the 4-inch by a 3½-hp single-cylinder air-cooled Wisconsin engine. Capacities at 10 and 20-foot suction lifts are 9,000 and 7,500 gph for the 3-inch pump size and 16,000 and 12,000 gph for the 4-inch size, according to the manufacturer. Both units are available with skid mounting, steel wheels, pneumatic tires, or a Hi-Speed trailer with 6:00 x 16 tires.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 153.

Load-Limit Switch

An instrument for operating an electric switch when cable tension reaches a predetermined value is now offered by the Martin-Decker Corp., 3431 Cherry Ave., Long Beach 7, Calif. It may be applied to any wire cable from ¼ to ¾-inch diameter without cutting or removing the cable.

A rectangular alloy-steel beam is clamped on the cable, and an offset is placed in the cable which deflects the beam so that the loading will operate the switch. An adjusting screw is provided in order to set the switch to the predetermined load. An auxiliary stud is also provided for sealing the switch when it is used as a limiting device.

The switch can be used with closed contacts connected in series with a holding coil of the hoist-motor magnetic starter. Or the open contacts can be connected to close an alarm circuit when the load limit has been reached. Other variations are also possible. The load limit can be set either at the factory or by the purchaser to any value from 500 to 25,000 pounds of single-line pull.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 113.

Flexibility of Standardized Metal Buildings Explained

The use of standardized metal buildings for construction, industrial, or commercial use is fully explained in a 12-page booklet offered by The Steelcraft Mfg. Co., 9100 Blue Ash Road, Rossmoyne, Ohio. This catalog points out that Steelcraft buildings are permanent yet can be modified or enlarged as required. They may be dismantled and re-erected at new locations without loss of material. All features, design specifications, and applications for each of the five standard models are given in the folder.

The units are available in any length and may be obtained in clear span widths of 16, 20, 32, 40, and 50 feet. The unobstructed height of side walls varies from 12 to 14 feet. Steelcraft points out that additional widths are obtained by placing two or more buildings side by side. When buildings are placed in this manner the interior wall panels are omitted but the two rows of columns are retained for structural strength. Detailed cross-section diagrams and job-site photographs illustrate the construction and erection of buildings. The folder also points out that standardized canopy extensions of 4, 6, and 11 feet are available.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 39.

Steel Wrecking Ball

All-purpose cast semi-steel wrecking balls, available in six weights, are made by Frederick Iron & Steel, Inc., Frederick, Md. Designed for breaking concrete roads and foundations, breaking scrap iron, wrecking buildings, etc., these balls are made in 500, 1,000, 1,500, 2,000, 3,300, 4,000, and 6,500-pound weights. Other weights may be obtained if required. A heavy inverted steel eye is designed to provide cable protection and free-swinging action. Special release hooks may also be obtained from Frederick.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 149.

Convertible Truck Shovel

Bulletin No. E-9 on the Quick-Way convertible truck shovel, designed for operation on any 5-ton truck chassis, is offered by the "Quick-Way" Truck Shovel Co., P. O. Box 1800, Denver 1, Colo. The construction, specifications, and operating dimensions of the Model E are presented in this 20-page booklet.

Convertibility of the unit is highlighted. Its features as a 4/10-cubic-yard shovel, trench hoe, or dragline, 6-ton crane, clamshell, orange peel, and pile driver are individually discussed. The folder also points out the value of interchangeable component parts. All parts of the five clutches are interchangeable, as are the three brake bands, the hydraulic cylinders in clutches and control cabinet, and many gears and bearings.

Illustrations include on-the-job photographs, pictures of component shovel parts, and dimensioned drawings of the units.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 100.

Convention Calendar

Feb. 20-22—American Concrete Institute

Annual meeting, American Concrete Institute, Edgewater Beach Hotel, Chicago, Ill. Harvey Whipple, Secretary-Treasurer, 18263 W. McNichols Road, Detroit 19, Mich.

Feb. 21-23—North Atlantic Highway Officials

Annual convention, Association of Highway Officials of North Atlantic States, Hotel Statler, New York City, N.Y. A. Lee Grover, Secretary, New Jersey Highway Department, Trenton, N. J.

Feb. 21-24—Engineering Exposition

Fifth annual exposition, Minnesota Federation of Engineering Societies, Minneapolis Armory, Minneapolis, Minn. Brede, Inc., 1720 New Brighton Blvd., Minneapolis 13, Minn.

Feb. 27-March 2—AGC Convention

Annual convention, Associated General Contractors of America, Inc., The Palace Hotel, San Francisco, Calif. H. E. Foreman, Managing Director, Munsey Bldg., Washington 4, D. C.

Feb. 27-March 3—ASTM Meeting

Committee week and spring meeting, American Society for Testing Materials, Hotel William Penn, Pittsburgh, Pa. C. L. Warwick, Executive Secretary, 1916 Race St., Philadelphia 3, Pa.

Feb. 28-March 2—Highway Conference

Thirty-sixth Annual Illinois Conference on Highway Engineering, Illini Union Bldg., University of Illinois, Urbana, Ill. R. K. Newton, Supervisor, Engineering Extension, 205 Arcade Bldg., Champaign, Ill.

March 2-3—Kentucky Highway Conference

Annual meeting, Kentucky Highway Conference, University of Kentucky, Lexington, Ky. Professor R. E. Shaver, Dept. of Civil Engineering, University of Kentucky, Lexington, Ky.

March 6-9—ARBA Meeting

Annual meeting, American Road Builders' Association, Netherlands Plaza Hotel, Cincinnati, Ohio. Charles M. Upham, Engineer-Director, International Bldg., Washington 4, D. C.

March 9-11—Miss. Valley Conference

Mississippi Valley Conference of State Highway Departments, Edgewater Beach Hotel, Chicago, Ill. H. E. Surman, Secretary-Treasurer, Illinois Division of Highways, Springfield, Ill.

March 22-25—Roadside Development

Ninth Annual Conference on Roadside Development, Departments of State Bldg., Columbus, Ohio. Charles R. Sutton, Department of Architecture and Landscape Architecture, The Ohio State University, Columbus 10, Ohio, or Wilbur J. Garmhausen, Chief Landscape Architect, Department of Highways, Columbus 15, Ohio.

March 28-31—Safety Convention

Twentieth Annual Safety Convention and Exposition, Greater New York Safety Council, Hotels Statler and Governor Clinton, New York City, N. Y. Paul F. Stricker, Executive Vice President, 60 E. 42nd St., New York 17, N. Y.

March 29-31—Utah Engineering Conference

Eleventh Utah Highway Engineering Conference, Union Bldg., University of Utah, Salt Lake City, Utah. Professor A. Diefendorf, Head, Civil Engineering Department, University of Utah, Salt Lake City, Utah.

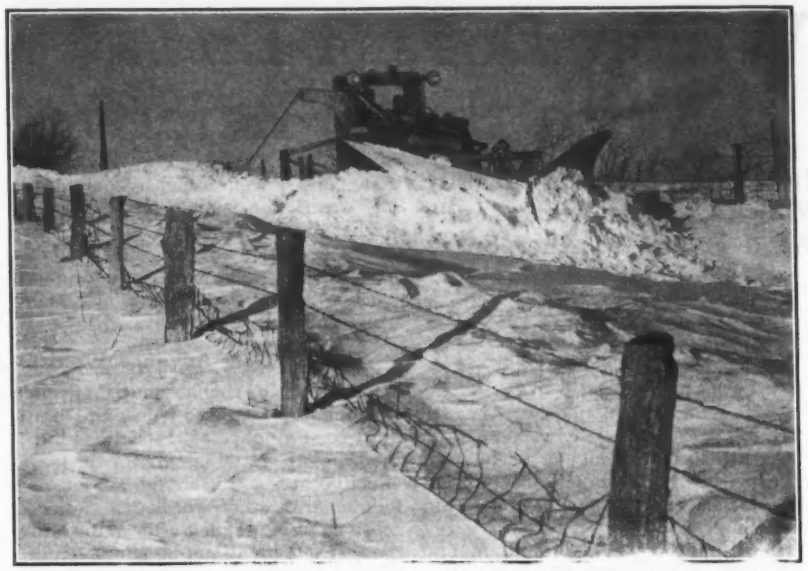
April 3-6—Ohio Engineering Conference

Ohio Highway Engineering Conference and Road Show, Ohio State University, Columbus, Ohio. Emmett H. Karrer, Professor of Highway Engineering, Brown Hall, Ohio State University, Columbus 10, Ohio.

Machine-Shop Handbook

A reference book on machine design and shop practice, suitable for use in the office or shop by engineers, contractors, or machinists, is published by The Industrial Press, 148 Lafayette St., New York 13, N. Y. This is the 14th edition of "Machinery's Handbook" authored by Erik Oberg and F. D. Jones. Recent and revised engineering standards are included, together with a large amount of general information and mechanical data representing the latest designing and manufacturing practice.

Topics covered in this 1,900-page handbook, to mention only a few, include: mathematical tables, principles, and formulae; engineering drawing; theory of mechanics; strengths of materials; riveting; welding; properties and weights of materials; heat treatments, finishes, and methods of testing ferrous and non-ferrous alloys; and detailed information on all types of fasteners, gears, tools, dies, etc. The book costs $7.00.



Snowbound roads to the Garfield school in Vernon County, Wis., are opened by an Allis-Chalmers grader and V-type plow. Many of our 4,706,209 bus pupils depend for their educational opportunity on improved farm-to-market roads and efficient snow removal.

Winter Doesn't End With Snow Removal

Here's a Highway District Which Controls Traffic Loads As a Follow-Up After Snow Removal Is Done

By G. A. MESKAL,
District Maintenance Engineer,
Minnesota Department of Highways
With RAYMOND P. DAY
Western Editor

✦ THERE is no point in keeping a highway open all winter just to let heavy loads rupture the pavement in the spring.

That is the policy of C. L. Motl, Maintenance Engineer of the Minnesota Department of Highways. It is no better exemplified than in District 2, with headquarters in Duluth. Mark Twain once said the coldest winter he ever spent was one summer in Duluth, but he failed to say anything about the weather in December. Neither did his comment cover anything about frost heaves.

District 2, as a matter of fact, survives each winter after some of the most brutal weather in the nation. When winter temperatures plummet down to 35 below zero, and hover around zero for weeks on end, highways freeze. The frost often penetrates 4 to 5 feet deep. While the winter winds howl, and snow comes down, district maintenance men patrol the roads with snow-removal equipment and keep them open to traffic. As soon as the snow problem is over, the maintenance engineers then close the highways, but only to certain kinds of traffic.

When the frost leaves the ground, subgrades get mushy and lose their bearing value. Thus, unless heavy loads were restricted, the "spring breakup" would apply most of all to highway pavements.

Consideration for Truckers

In carrying out the traffic control policy, maintenance men follow orders issued from St. Paul by Motl, who tries to cause as little inconvenience as possible to truckers who are most affected by the regulations. Motl's policy is to get as much information as possible from the district, and then to disseminate it in advance to the truckers so they will know what to expect.

The spring breakup can usually be expected in Duluth about March 15. The period of greatest danger of damage to highway pavements lasts until the first of June. It is customary, about February 20, for the Duluth office to receive a routine letter from Motl at St. Paul. In it he asks for weight-limit recommendations for all the highways in the district.

The recommendations made are based on the history of the highways, their behavior under similar circumstances in the past, and upon bearing tests which now are being made on various soils and highway bases. The Duluth recommendation is then combined with those of the several districts throughout the state, and a comprehensive statewide load restriction is then made.

The purpose of the study is to give advance notice by special bulletin, newspapers, radio, and telephone to all truckers and other operators of vehicles using the trunk highways.

St. Paul Gets Advance Word

In order to get as much advance warning as possible to truckers, Duluth must send a notice of restrictions to St. Paul before 11:00 a. m. for it to be effective at 9 a. m. on the second day following. In other words, if a notice is received on a Monday after 11:00 a. m., the restriction will not be effective until Thursday at 9 a. m.

Notices which are received in St. Paul at any time on Friday become effective Monday morning at 9 a. m., and those received Saturday carry over until Tuesday morning. As a rule, restriction notices are sent in by mail, but if conditions warrant, they can be given by telephone or telegraph.

In case a breakup should develop suddenly, which could cause serious damage, the Duluth district office is permitted to post restrictions immediately. In a case like this, however, the St. Paul office is notified by telephone as soon as the condition is discovered, so as much advance notice can be given as possible. A special report is also provided for the confirmation of these emergency cases.

Particular About Signs

The law requires that signs shall be erected "at both ends of the section thereof on which traffic is restricted, at intermediate points where said restricted section is intersected by cross-roads, and also at the points where said restricted highways leave the nearest municipality."

Instructions go out to the maintenance men who post the signs to place them properly, so that the restriction cannot be interpreted as applying to a side road rather than the main trunk highway. Signs are placed on the trunk routes on both sides of the intersecting highway, and on the right-hand side of the trunk highway. Signs placed in this manner eliminate all confusion, and they also comply with state law which makes them possible.

C. & E. M. Photo
District Maintenance Engineer G. A. Meskal (seated) talks over equipment repair with A. W. Milton, Shop Foreman at Duluth.

Permits are never issued at any time to allow movement of overloads over a restricted highway. Only in the case of road surfaces becoming sufficiently frozen to permit an emergency move is a permit allowed, and then only by removing the posted signs entirely, or by changing the posted limit. No change can be made in the posted restriction under any circumstances, if there is any doubt that the surface will support the heavier load.

Restriction Policy

Gravel-surfaced roads, and particularly new construction, is restricted if necessary to 3 tons per axle. Stabilized gravel and bituminous surfaces with stabilized bases are restricted to prevent serious damage from axle loads that are excessive. Therefore, trunk highways which show any indications of breaking up are restricted as soon as danger becomes imminent. The maintenance department never takes a chance by not taking action until a highway has become impassable. It costs too much money the next year to cor-

(Continued on next page)

rect that kind of mistake.

Weight restrictions are usually based on axle weights of 3, 4, 5, or 7 tons. The maximum legal weight limit in Minnesota is 9 tons on a single axle, and permissible weights go down from there in accordance with the table illustrated.

Enforcement

No weight restriction, of course, is better than its enforcement. In Minnesota the enforcement is good. Continuous round-the-clock patrols by uniformed troopers of the Minnesota Highway Patrol are maintained during the entire critical period. As a rule a maintenance employee accompanies the policeman, to do the manual work in connection with weights, scales, and so on.

When a violator is found, he is promptly arrested, he is not permitted to move his load until he has shifted part of it to other vehicles, and he is taken to the nearest justice of the peace for trial. This usually results in a fine, sometimes quite stiff. A justice who metes out a $100 fine for one offense usually takes care of the weight excesses around that territory for weeks, because with truckers the "word" gets around.

Naturally there are many arguments, pro and con, regarding weight restrictions on highways. Minnesota simply has taken the attitude that the public has too much of an investment at stake to allow a few overloaded vehicles to do irreparable damage during the few short weeks when the danger is critical.

Snow Removal Serious

Serious and conscientious as District 2 is about weight restrictions, it is equally determined to keep the highways open to traffic all through the winter. It is sometimes a hard and brutal battle. The weather is rough, and sometimes when blizzards howl across Lake Superior to strike Duluth and the North Shore with their full fury, it is almost more than men can take.

The maintenance district includes the trunk highways in Pine, Carlton, and Cook Counties, the southern part of St. Louis and Lake Counties, and the eastern part of Aitkin County. There is a total of 780 miles, including 433 miles of bituminous surface, 223 miles of concrete, and 136 miles of gravel. This is in addition to the trunk highways within the city of Duluth, which are maintained by the City under a cooperative agreement. The gravel-surfaced roads are generally the unimproved type, while the bituminous and concrete pavements are of a much higher type of construction.

The district is so situated that some of the highways are in the open or agricultural area. Highways for the most part, however, are situated in the timbered country. Drifting, consequently, is not one of the major snow-removal problems. Trunk Highway 61 is somewhat peculiar, extending as it does 250 miles from the southern end of the district to the Canadian line. There is often a violent snowstorm at one end while the other is enjoying sunshine.

Trunk Highway 61 also parallels the north shore of Lake Superior for a distance of 150 miles from Duluth to the Ontario line. Beyond Two Harbors, only 26 miles out of Duluth, there is no railroad. The only means of transportation is the highway.

It is on this North Shore road that snow plowing was first inaugurated in 1921 by P. D. Mold, District Engineer, who at that time was District Maintenance Engineer. The section of highway from Two Harbors to Grand Marias was plowed for the purpose of keeping open the Star Mail Route between these two points. The first snow plows were made in the D.M.&I. Railroad shops in Two Harbors. These were later developed and improved by the Highway Department, but they have long since given way to the most modern equipment money can buy.

In those early days, the round trip required about 8 days, depending on the number of equipment breakdowns and the amount of snow encountered. The first old road was located through the heart of a snow belt a few miles inland from Lake Superior, where it snows every day. The old road was hilly, winding, narrow, and had little snow-storage space. Subsequent revisions have changed the location to a point nearer the shore, and this in part has helped to eliminate the condition. This road is now seldom, if ever, blocked for more than a few hours at a time.

It is the policy of the Duluth district to get the plows out as soon as it starts to snow, in order to keep traffic moving at all times. Early plowing keeps the snow in motion, and prevents packing or drifting to a great extent. Plowing goes on day and night during a storm, and the only time the plows are called in is when the visibility is so bad that the operation endangers the crews and whatever traffic is on the highway.

Crews may also be called in at night, whenever snow-plowing operations

(*Concluded on next page*)

STATE OF MINNESOTA
DEPARTMENT OF HIGHWAYS
TABLES FOR DETERMINING THE MAXIMUM LEGAL GROSS WEIGHT PERMITTED ON ANY TWO OR MORE CONSECUTIVE AXLES ON ANY VEHICLE OR COMBINATION OF VEHICLES.

THE GROSS WEIGHT ON ANY ONE AXLE SHALL NOT EXCEED 18000 LBS.

USE THIS TABLE
For permissible GROSS WEIGHTS (W in pounds) when the distance (L in feet) between the first and last axles of the group of axles under consideration is less than eighteen (18) ft.

FORMULA W = 650 (L + 40)

L Feet	W Pounds	L Feet	W Pounds
0'	18000	9'-0"	31850
1'-0"	18000	9'-6"	32175
2'-0"	18000	10'-0"	32500
3'-0"	18000	10'-6"	32825
3'-3"	18000	11'-0"	33150
3'-4"	28167	11'-6"	33475
3'-6"	28275	12'-0"	33800
3'-9"	28437	12'-6"	34125
4'-0"	28600	13'-0"	34450
4'-3"	28762	13'-6"	34775
4'-6"	28925	14'-0"	35100
4'-9"	29087	14'-6"	35425
5'-0"	29250	15'-0"	35750
5'-6"	29575	15'-6"	36075
6'-0"	29900	16'-0"	36400
6'-6"	30225	16'-6"	36725
7'-0"	30550	17'-0"	37050
7'-6"	30875	17'-6"	37375
8'-0"	31200	17'-11"	37646
8'-6"	31525		

USE THIS TABLE
For permissible GROSS WEIGHTS (W in pounds) when the distance (L in feet) between the first and last axles of the group of axles under consideration is eighteen (18) feet or more.

FORMULA W = 750 (L + 40)

L Feet	W Pounds	L Feet	W Pounds	L Feet	W Pounds
18'-0"	43500	27'-0"	50250	36'-0"	57000
18'-6"	43875	27'-6"	50625	36'-6"	57375
19'-0"	44250	28'-0"	51000	37'-0"	57750
19'-6"	44625	28'-6"	51375	37'-6"	58125
20'-0"	45000	29'-0"	51750	38'-0"	58500
20'-6"	45375	29'-6"	52125	38'-6"	58875
21'-0"	45750	30'-0"	52500	39'-0"	59250
21'-6"	46125	30'-6"	52875	39'-6"	59625
22'-0"	46500	31'-0"	53250	40'-0"	60000
22'-6"	46875	31'-6"	53625		
23'-0"	47250	32'-0"	54000		
23'-6"	47625	32'-6"	54375		
24'-0"	48000	33'-0"	54750		
24'-6"	48375	33'-6"	55125		
25'-0"	48750	34'-0"	55500		
25'-6"	49125	34'-6"	55875		
26'-0"	49500	35'-0"	56250		
26'-6"	49875	35'-6"	56625		

Winter Doesn't End With Snow Removal

(*Continued from preceding page*)

continue for a long period during the daytime and early night. Thus the crew can rest, and be ready to continue work early the following day. In case a storm should start up during that same night, the crews get out at least by 5 a. m. in order to have a road opened up for school busses, milk trucks, and other early morning traffic.

For snow-plowing work, as well as for other routine highway maintenance, District 2 is divided up into 23 sections. Each crew is responsible for all work within that section. The highway assigned to each section varies from 21 to 47 miles, depending upon the type and condition of the road. Regularly assigned to each of these sections are 2 and 2½-ton trucks, each of which is equipped with a one-way plow. Some are also interchangeable with V-plows. Several of the 2½-ton trucks are also equipped with hydraulically operated wings.

At strategic locations throughout the district there are 6 four-wheel-drive 3 to 5-ton trucks, and 4 heavy-duty 5-ton trucks equipped with one-way plows, interchangeable with V-plows and wings. This heavy equipment is used primarily for winging operations, but also supplements the smaller units when necessary. Although they are usually assigned definitely to certain stations, they are shifted wherever needed.

A Snogo, several extra 1½-ton trucks, and a 4-wheel truck are stationed at district headquarters for emergency use.

The district has standardized on the type of plow mounting, using a heavy steel yoke to carry the plow when it is not working. The connection is simple and foolproof, and any plow in the district can be put on in a matter of a few minutes. The truck drives in over the plow frame, picks up the yoke on a permanent connection on the truck, a bar and two pins are inserted there, and the plow arms are fastened to the underside of the truck by two more pins to hangers. It is then ready to go to work.

Minor equipment repairs are made at the various stations. Major breakdowns are usually brought to the Duluth district shop, which has complete equipment for repairs, overhauls, and maintenance.

Slat snow fence is erected at the locations where drifting is liable to occur. This is more or less in the open areas on unimproved roads.

One of the main winter maintenance problems in the district is the packed snow and ice condition, due to the nearness of Lake Superior. This condition is generally found during the early or late winter season. Eight motor graders, scattered at strategic places, are used to remove packed snow and ice. There are also stockpiles of calcium chloride or rock-salt-treated sand, for use whenever icy and packed snow conditions exist. Mechanical sanding machines are standard equipment at most of the stations.

The snow crews keep the district office informed by telephone, during storms, of the road conditions. This information is transmitted to St. Paul, where it is incorporated in road-condition reports covering the entire state. Road-condition information service is available through the Duluth office, and during extensive storms someone is always on duty to give out these bulletins.

District maintenance forces consist of G. A. Meskal, District Maintenance Engineer and the co-author of this piece, a District General Foreman, a Shop Foreman, a District Clerk, and the various maintenance foremen, their equipment operators, maintenance men and helpers, mechanics and clerks. Altogether there are approximately 93 regular employees in District 2, who take part in the service of snow removal and traffic control.

C. & E. M. Photo
In Minnesota's District 2, snow-plow trucks are "on the line" at the end of August for engine tune-up ahead of the snow season.

Power-Grader Catalog

An 8-page catalog on the Trojan Welterweight Patrol, an all-purpose motor grader, has recently been issued by Contractors Machinery Corp., Inc., Batavia, N. Y. The folder provides a full description of the equipment and its accessories, including features and complete specifications.

Attachments for the Trojan include: scarifier, snow plow, bulldozer, front-end loader, and a weathertight or canopy-top cab. These, the catalog explains, are designed to make the grader a year-round tool. Photos and drawings illustrate on-the-job operations and construction features of the Trojan.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 145.

Distributor Doings

Successful Equipment Distributing In the '50's—What Will It Take?

As the competitive 1950's came rolling in, construction-equipment distributors all over the country were engaged in soul-searching. What would it take to stay in business and thrive in the face of this increased competition?

Donald V. Buttenheim, General Manager of CONTRACTORS AND ENGINEERS MONTHLY, had some suggestions to make to the New England Equipment Distributors Association when it met recently in Hartford, Conn. "Are you trying to develop *some unique angle* in your facilities or operating technique that will set you off in a class by yourself compared to competing dealers?" he asked, in an address entitled "Check-List for Successful Equipment Distributing in the Competitive '50's". For example, have you on tap complete where-to-purchase data that makes you virtually an information headquarters for your area? Have you tried setting up operator and service training schools in off-season months to make sure your customers are getting out of their equipment all that manufacturers have put into it?

"And are you taking full advantage of publicity opportunities in various construction magazines?" he asked. Are you getting news of account changes and personnel items to the magazines before they have become ancient history? "Is your own space and direct mail advertising doing anything to promote *your* company, *your* service facilities, *your* customer benefits rather than just the lines you handle?" Have you adapted the never-say-die philosophy? Have you analyzed your service facilities from your customer's point of view?

All these questions, Mr. Buttenheim pointed out, add up to one big question: "Are all your operations in step with accepted public-relations thinking?" Not that public relations is anything new, he said. It simply means doing every part of your job a bit better—and the first step toward a better job is self-analysis and correction—then letting the world know about it. It's doing good, then talking.

Guy Berger of H. O. Penn Machinery Co., Newington, Conn., and New York City, is President of the New England Equipment Distributors Association, Region I of the AED. The meeting program—which included some very unusual amateur entertainers, and was topped off by a steak dinner—was arranged by Larry Deephouse of Deephouse Equipment Co., Berlin, Conn.; Roy W. Bleiler of R. W. Bleiler Equipment Co., West Hartford; and Terry Holmes of Holmes-Talcott Co., Hartford.

New Distributors for Gumout

As a major part of an accelerated sales and promotion program to build national distribution for Gumout, the Gumout Division of the Pennsylvania Refining Co. has appointed nine new sales representatives.

L. H. Cox Associates, Minneapolis, Minn., will serve North and South Dakota, Minnesota, Iowa, northern Wisconsin, and the upper peninsula of Michigan. California, Nevada, and Arizona have been assigned to F. Somers Peterson Co., San Francisco, Calif. James H. Page, Denver, Colo., will cover the mountain states. Winkenweder & Ladd, Chicago, Ill., will serve distributors in Illinois, Indiana, Michigan, southern Ohio, eastern Missouri, and southern Wisconsin. E. M. Arnold, Pittsburgh, Pa., has taken the territory of West Virginia, eastern Ohio, and western Pennsylvania. Schade Sales Co., Moorestown, N. J., has been assigned the District of Columbia, Maryland, Delaware, eastern Pennsylvania, and southern New Jersey. Lew Brown & Co., Rochester, N. Y., will serve New York State. And the Saunders Co., Greensboro, N. C., will serve South Carolina, Georgia, and Florida.

Heads Mack Distributors

Mack - International Motor Truck Corp., New York City, has appointed Albert G. Crockett Manager of Distributor Sales to head up the company's domestic and Canadian wholesale organization of some 500 distributors. Mr. Crockett became well known in the truck world as a result of his wartime "Keep 'Em Rolling" national tours sponsored by Mack in cooperation with ODT in the interest of truck conservation. More recently he has served as director and lecturer for the company's diesel caravan which presented Mack's three new diesel engines to truck operators across the country.

Four Distributors for Maginniss

Maginniss Power Tool Co., of Mansfield, Ohio, has appointed four dealers to handle its Hi-Lectric line of concrete vibrators, saws, grinders, and generators. The dealers are: Korte Bros., Inc., Fort Wayne, Ind., which will cover northern Indiana; Telford Equipment Co., Lansing, Mich., with Michigan as its territory; Highway Equipment Co., of Cincinnati, Ohio, which will distribute the Hi-Lectric line in southwestern Ohio; and the Baldwin Machinery Co., Charleston and Clarksburg, W. Va., which will cover the state of West Virginia.

Howard-Cooper Moves in Seattle

J. G. Watts Construction Co. recently completed a new $250,000 building at 5055 Fourth Ave., S., in Seattle, Wash., for the Howard-Cooper Corp., construction-equipment distributor of Portland, Oreg. The new quarters include a large display room, sales and administrative offices, recreation room, a dustproof air-conditioned shop for overhaul work on diesel injection pumps, shipping and parts storage, and a paved customer parking lot.

Howard-Cooper Corp. distributes more than 30 lines in Oregon and western Washington. F. T. Isaacson manages the Seattle branch. Other branches are maintained at Eugene, Albany, Roseburg, and Central Point.

Represents Hydro-Line in Illinois

G. R. Carrier, 1815 W. 95th St., Chicago, is now exclusive representative for Hydro-Line air and hydraulic cylinders in northern Illinois.

Handles Willard Sales World-Wide

The Willard Concrete Machinery Sales Co. has recently been created to handle the products of Willard Concrete Machinery Co., Ltd., Lynwood, Calif. The company will distribute on a world-wide basis Willard concrete machinery,

(*Continued on next page*)

Distributor Doings

(*Continued from preceding page*)

truck-mixers, weigh batcher loaders, and portable conveyors.

R. M. Tomb, President of the sales company, was formerly General Sales Manager of the Machinery Company. He has announced that his company is interested in additional outlets in the United States. Dealers may obtain information by writing to the Willard Concrete Machinery Sales Co., 2906 Imperial Highway, Lynwood, Calif.

Oregon Distributor for Lippmann

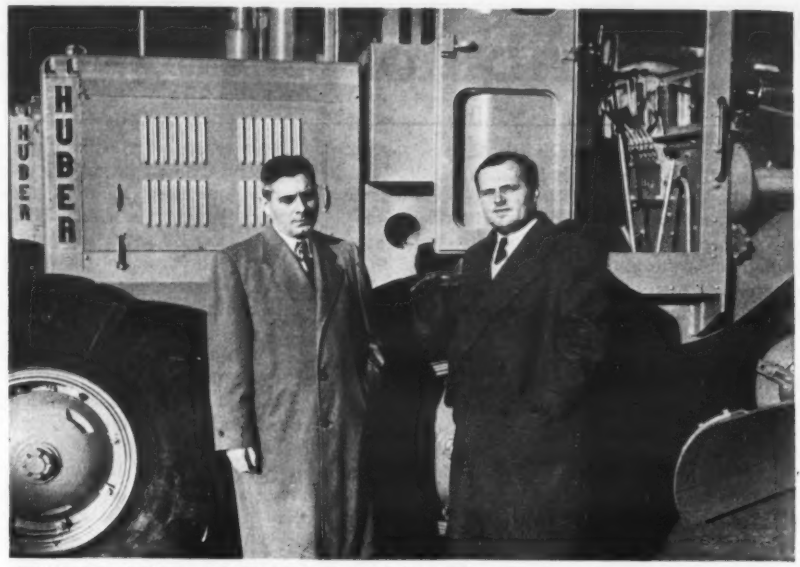
Loggers & Contractors Machinery Co., of Portland Oreg., with branches at Eugene and Klamath Falls, Oreg., has been serving since the first of the year as Oregon distributor for Lippman Engineering Works crushers, screens, belt conveyors, etc. The firm is headed by A. Freeman Sersanous, Past President of Associated Equipment Distributors. Among the other lines it handles are Ingersoll-Rand, Rex, Cletrac, Galion Iron Works, Harnischfeger, LeTourneau, Macwhyte, and Hercules.

Riddell Names Dealer in St. Paul

Construction Equipment Sales, Inc., 2264 University Ave., St. Paul, Minn., is now a distributor for W. A. Riddell Corp. motor graders in the state of Minnesota. The company will stock a complete line of Warco parts and equipment in its St. Paul plant. An arrangement for the convenience of Warco customers in the western part of the state enables them to obtain Warco parts and service from Arrowhead Equipment & Supply Co., Hibbing, Minn.

A. H. Cox & Co. Has New Branch

A. H. Cox & Co., a construction-machinery company of Seattle, has opened a new branch in Wenatchee, Wash. The concrete-block building provides office, shop, and salesroom facilities. C. A. Russell is Branch Manager.



Willis Nye, left, Export Manager of the Huber Mfg. Co., shows Jean F. Biron around the Huber plant. Mr. Biron is President of Societe d'Importation de Materiel d'Entreprise, a Huber distributor in Paris.

French Distributor Visits Huber

Jean F. Biron, President of a French distributor of Huber road machinery, recently visited the Huber plant at Marion, Ohio, during a tour of American industrial concerns. The name of his company is Societe d'Importation de Materiel d'Entreprise, and it is located at 23 Rue Boissiere in Paris. One of France's largest suppliers of earth-moving and road equipment, the company has branch offices representing Huber in French Morocco and Algeria, North Africa.

Canadian Dealer for Welding Firm

The Rudel Machinery Co., Ltd., of Montreal, Canada, was recently appointed a distributor for the Nelson Stud Welding Division of Morton Gregory Corp., Lorain, Ohio. The company carries an inventory of standard Nelson MG studs and special-purpose fasteners in Montreal and in its Toronto, Windsor, and Vancouver branches.

Midwest Dealers Elect Cruger

Two Thor distributors exchanged the gavel at the 17th annual meeting of the Central States Industrial Distributors Association last November in Chicago.

Frank M. Cruger, partner in Indiana Manufacturers Supply Co., Indian-

(*Concluded on next page*)

Distributor Doings

(*Continued from preceding page*)

apolis, succeeded William C. Teare, President of Sterling Products Co., Inc., Chicago, as President of the Association, which embraces 61 distributor companies in Illinois, Indiana, Iowa, Nebraska, and Wisconsin.

Carter Appoints Distributors

The Ralph B. Carter Co., of Hackensack, N. J., has appointed four new dealers in Colorado and one in Florida. The Colorado dealers, all of Denver, are: Harry J. Glass & Associates as manufacturer's representative for both the contractor and irrigation line of Humdinger pumps; King & Kringel Machinery Corp. and Gunderson-Taylor Machinery Co. for contractor pumping equipment; and Colorado Pump & Supply Co. for irrigation pumps. Harry P. Leu, Inc., of Orlando, Fla., is distributor for the entire Carter line in the state of Florida.

Metalweld Represents Lima

Metalweld, Inc., Philadelphia, Pa., now represents the Lima-Hamilton Corp. in eastern Pennsylvania, southern New Jersey, and Delaware. It handles the company's complete line of shovels, cranes, draglines, etc.

Pringle-Gerlach Caterpillar Dealer

Pringle-Gerlach Machinery Co. has taken over as Caterpillar dealer in Santa Cruz and Monterey Counties, California. The organization succeeded Cornell Tractor Co. following the retirement of Frank Cornell.

W. B. Pringle was formerly Caterpillar's Divisional Sales Manager for western Europe and Africa. H. W. Gerlach was a Caterpillar dealer in Topeka, Kansas, before his move to California.

New Calculator Aids Steel Design Work

A calculator for use in designing structural steel has been developed by Calculator Design Service, Inc., 101 Park Ave., New York 17, N. Y. It may be used by contractors, engineers, architects, and students for the solution of stress analysis. It is 8 x 10½ inches in size and is finished with a protective coating to prevent soiling. Easy to carry, it may be slipped into a briefcase for field use in checking stresses of beams and columns. An instruction manual with illustrative examples is furnished with each Structural Calculator.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 61.

Soil-Mechanics Volumes At Reduced-Dollar Price

You can now purchase in this country, at reduced-dollar prices, the proceedings of the Second International Conference on Soil Mechanics and Foundation Engineering, which took place in Rotterdam, Holland, in June, 1948. The six volumes are written in English and contain nearly 500 articles on many soil-mechanics subjects from many countries. They cost $21.00. A seventh volume scheduled for early publication will be shipped when available at a cost of $4.00.

Remittances should be made payable to the Department of Civil and Sanitary Engineering, M. I. T., and should be addressed to Professor Donald W. Taylor, Secretary of the International Society of Soil Mechanics and Foundation Engineering, Room 1-330, Massachusetts Institute of Technology, Cambridge 39, Mass. Readers who would like to be placed on the soil-mechanics mailing list now being prepared by the International and National Societies should send name, title, and address to Professor Taylor.

Fluid-Transfer Pump

A bulletin describing a high-speed air-operated transfer pump designed to move fluids at a rate of 18 gpm is offered by the Gray Co., Inc., Minneapolis 13, Minn. Specification Sheet No. 10 indicates that the rate of delivery of the Graco Fast-Flo pump is in direct proportion to the viscosity of the fluid. The pump may be used to save time in transferring paints, thinners, lubricants, coolants, non-corrosive chemicals, and other materials from their original containers to equipment tanks. It fits all drums with 2-inch openings and includes an adjustable bung-hole adapter, a spout with hook, and an air valve for speed control.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 36.

The Rex Adjustable Discharge Moto-Mixer—a horizontal drum mixer featuring high discharge.

New Adjustable Mixer

A new horizontal drum mixer with high discharge, the Rex Adjustable Discharge Moto-Mixer, has been announced by the Chain Belt Co., 1600 W. Bruce St., Milwaukee 4, Wis. Features claimed for this new mixer include fast and thorough mixing, fast charging, fast discharging, and the economical operation of a horizontal mixer with the versatility of a high-discharge mixer. The unit is made in 3, 4½, and 5½-cubic-yard capacities.

The discharge of the mixer can be elevated to a maximum height approximately equal to any high-discharge type of mixer, according to the manufacturer. It may also be elevated to any intermediate point in the hoist range. This, Chain Belt says, increases job flexibility and speeds the whole process of getting concrete into the forms by reducing spout manipulation to a minimum.

Other Rex features include, chain drum drive, Manten steel drum and blades, enclosed water system, and fluid drive for better operating conditions.

Further information may be secured from the company by requesting the Bulletin 49-13. Or use the Request Card at page 16. Circle No. 141.

Brush Chipper Described

A 4-page folder describing the Asplundh Brush Chipper is now offered by the Asplundh Chipper Co., 501 York Road, Jenkintown, Pa. Powered by a 25-hp motor, the chipper is designed to handle limbs in sizes up to 5 inches in diameter, the catalog explains. Brush inserted at the intake chute is automatically drawn into the machine. Chips are ejected and, if desired, can be directed by chuting into bins, wagons, trucks, or piles on the ground. The operating characteristics and the component design features are fully explained. The catalog points out that the chipper may be obtained as a basic unit, truck-mounted, trailer-mounted, or tractor-mounted.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 135.

Floodlights for Shovel And General Utility Use

A 42-page pocket-size catalog issued by the S-M Lamp Co., 119 W. 36th Place, Los Angeles 54, Calif., presents a full line of portable and fixed floodlights for power-shovel and general utility use.

Full specifications are given for the 250-watt G-FL Shovel-Lite, which is mounted on a shock-absorbing spring base and is designed especially for use on power shovels, cranes, and other equipment having 120 or 240-volt ac or dc current. The reflector is 9¼ inches in diameter and has a 100-degree beam.

Other lights listed in the catalog include the open-type floodlights ranging up to 2,000-watt capacity without lenses, and up to 1,500 watts with lenses; and the closed-type floods with a 250 to 1,500-watt capacity range. A wide range of brackets designed to make these floodlights universally adaptable is presented. Complete specifications, illustrations, descriptions, and prices are given.

This literature may be obtained from the company by requesting Catalog EH-49, or by using the Request Card at page 16. Circle No. 49.

B&D Moves Atlanta Branch

The Black & Decker Mfg. Co., of Towson, Md., has moved its Atlanta, Ga., sales and service branch to a new building at 316 Techwood Drive, N. W. The new location increases showroom space and service facilities for the company's portable electric tools.

Latest Issue on Fasteners

Volume 6, No. 2, of "Fasteners" has recently been prepared by the Industrial Fasteners Institute, 3648 Euclid Ave., Cleveland 15, Ohio. It includes four articles titled as follows: "Specials Are Made to Do Tough Jobs", by W. H. Hill, Manager, Industrial Fastener Sales, Scovill Mfg. Co.; "Power Impact Tools Are Key to Lower Assembly Costs", by A. G. Ringer, Application Engineer, Portable Power Tool Division, Ingersoll-Rand Co.; "Preloading Internal Wrenching Bolts", by J. J. Kovac, of the Goodyear Aircraft Corp.; "Safety Factors in Screw Thread Assemblies", by Howard L. Hopkins, Metallurgical Engineer, The National Screw & Manufacturing Co.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 66.

Crusher Co. Promotion

Edwin H. Keiper has been made Chief Service Engineer of the Pennsylvania Crusher Co., Philadelphia, Pa. Mr. Keiper joined the company as a draftsman in 1919. In 1939 he was appointed Chief Design Engineer, the position he held at the time of his recent promotion. As Chief Service Engineer, he is the immediate supervisor of each new job, from initial planning to operating installation. In addition, he is active as an advisor to the Sales and Engineering Departments.

C. & E. M. Photos

The two Apsco Model P-120 spreaders above are laying a cement-treated base on Ohio State Route 37. At right, a Galion 10-ton Chief compacts the base course.

Cement-Treated Base For Secondary Road

(*Continued from page* 1)

over 20 feet wide. From Granville it runs 8 miles south to an intersection with U. S. 40, and continues to Lancaster and points south and east. During the grading operations both the horizontal and vertical alignments were improved with the straightening of curves and the reduction of sharp grades.

By mid-August the subgrade was ready to receive the base course which is 20 feet wide. No side forms were required; a windrow of dirt from the shoulders was shoveled up by hand to contain the CTB along both edges. The subgrade was kept moist but not muddy in preparation for the base. Water was sprayed on by gravity from a spraybar at the rear of an International 600-gallon tank truck. The water was obtained in the village.

Gravel for the mix came from a pit, and was neither crushed nor washed; it contained about 8 to 9 per cent of silt or soil. The gravel was not graded but passed a 2-inch screen, and at the asphalt plant, where it was mixed with the cement and water, the aggregate was split over a ½-inch screen. The division was about 25 per cent coarse aggregate and 75 per cent fine. Mixing was done at the Newark Asphalt Co.'s commercial plant in Newark—a Hetherington-Berner unit with a 1½-ton pugmill.

The Mix

Columbia air-entrained cement from Fultonham, Ohio, was used in the mix at the rate of 3¼ bags per 3,000-pound batch. From 80 to 90 pounds of water was added at the plant to each batch which, together with the moisture in the gravel, brought the total moisture to around 290 pounds. Aggregate, cement, and water were mixed for one minute in the pugmill. The comparatively dry mix was discharged into trucks and covered with tarpaulins for the 11-mile-average haul to the job. Around 12 trucks, holding from 7½ to 9 tons, transported the material.

The gradation of the aggregate was:

Sieve Size	Per Cent Passing Coarse Aggregate	Fine Aggregate
2½-inch	100	....
1½-inch	95-100	....
¾-inch	40-100	....
⅜-inch	....	100
No. 4	0-5	95-100
No. 16	....	45-80
No. 50	....	10-40
No. 100	....	5-25
No. 200	....	2-15

The mix was laid on the damp subgrade by two Apsco All-Purpose Model P-120 spreaders, working abreast, each taking a 10-foot lane. The self-propelled machines pushed the trucks ahead as their contents were tail-gated into the spreader hoppers. The material was spread to a loose depth of 9½ inches so that it compacted under rolling to the required 6 inches. The base course was rolled, as soon as it was laid, by two Galion rollers—first by a 10-ton 3-wheel Chief, followed by an 8 to 12-ton tandem. Rolling began at the edges of the course and progressed gradually toward the center until the entire base had been thoroughly rolled and settlement ceased.

(*Continued on next page*)

C. & E. M. Photos

Above, a shot of asphalt emulsion, applied by hand hose from a South Bend distributor on a Chevrolet truck, seals the base for curing. Personnel on the Ohio secondary-road job included (left to right in photo at right): Laboratory Technician H. C. Anthony, Superintendent Fred Hull, Project Engineer Raymond Strohl, and Louis Wismar, Chief Engineer of Construction for the Ohio Department of Highways.

Cement-Treated Base For Secondary Road

(Continued from preceding page)

While the two spreaders which were used were the same model, one was equipped with two steel wheels, 26 inches wide, while the other machine had rubber-tired driving wheels. There was no difference in operations, but with the steel-wheel machine there was somewhat less rutting.

2,000-Pound Strength

Between the spreading of the dampish CTB material and the application of the curing compound, the surface of the base was lightly fogged with water to compensate for any loss of mixing water due to evaporation. Water was sprayed on from a garden hose hooked to a 200-gallon tank mounted on a light truck and equipped with an 1½-inch pump. The specifications required that the base be constructed with a true surface that would show a variation of not more than ⅜ inch from a 10-foot straightedge laid parallel to the longitudinal axis of the pavement.

For curing, the surface was sealed with a light spray of MS-1 asphalt emulsion at the rate of 0.2 gallon per square yard. It was applied by a hand hose spray from a South Bend 500-gallon distributor on a Chevrolet truck. A light cover of sand was then spread on over the bituminous seal coat. This was done by hand, using material from the Newark Sand & Gravel Co.

The base was laid at the rate of 600 to 700 linear feet of full 20-foot width in an 11-hour day, with a crew of eight for all operations. The base has a cement content of 9.2 per cent, and has an average density of 133 to 134 pounds per cubic foot. The specifications of the State Highway Department required a strength sufficient to withstand a load of 2,000 psi at the age of 28 days. According to tests, this required strength was attained after only 7 days, with a slightly higher figure being reached after the full 28 days.

Black-Top Surface

On top of the base a 1½-inch asphaltic-concrete surface course was laid. The hot-mix came from the plant of the Newark Asphalt Co. and was laid in two 10-foot lanes by a Barber-Greene Finisher. The black-top pavement is crowned at the center, with a 3/16-inch-per-foot pitch to the edges. The 20-foot pavement is flanked by 8 to 10-foot shoulders which slope 1 inch to the foot. On fills under 10 feet high, the side slopes are 4 to 1; over 10 feet the slopes are 2 to 1, and are protected with guardrail. In cuts 5 feet or less, the backslopes are 3 to 1; where the cuts are more than 5 feet in depth, the backslopes are sharpened to a 2 to 1 ratio.

New Bridge

The new 195-foot bridge on the highway replaces an old through-pin Pratt truss span of 93 feet over Raccoon Creek. The former bridge was designed for only an H-4.6 loading, and had a narrow roadway of 16 feet 9½ inches. The new structure has two concrete piers and abutments with a continuous steel beam superstructure designed for S 15-46 loading. The spans are 60-75-60 feet center to center of bearings. The concrete deck has a 26-foot roadway with two 4-foot sidewalks.

Quantities and Personnel

This type of base is the first of its kind in the state, and is regarded with interest for use in economical secondary-road construction. The CTB requires about half the cement that a regular concrete paving takes. Of course it does not develop the load-carrying

(Concluded on next page, Col. 3)

Performing as combination motor truck and fork-lift truck, the Lull Traveloader lifts, loads, unloads, stacks, and hauls steel, lumber, pipe, poles, etc.

Side-Loading Unit Performs Many Jobs

For handling capacity loads from 3,000 to 30,000 pounds, the new side-loading hydraulic Lull Traveloader is said to do the work of two or three conventional machines. It performs as a combination motor truck and fork-lift truck, but may also be used to do the work of the straddle-buggy, the tractor, and the yard crane, according to the Lull Mfg. Co., 3612 E. 44th St., Minneapolis 6, Minn. It lifts, loads, unloads, stacks, and hauls steel, lumber, pipe, poles, spooled cable—anything from a single piece to a capacity load from 6 to 66 feet long.

In operation, a hydraulic lift tower slides out 72 inches to insert its forks under the load. The load is then brought aboard by hydraulic power, and deposited on the Traveloader platforms. Weight of the payload is distributed equally over two axles and all wheels, with minimum ground pressure on each of the tires.

Used as a motor truck for runs of any distance, the Traveloader carries its own load at speeds up to 30 mph. Unloading itself from the side, the unit needs no space for backing and turning, and it stacks to any height from ground level to a deck-stacking height of 12 feet.

Two retracting hydraulic stabilizer jacks on the loading side permit safe handling of maximum weights 12 feet high, extended 64 inches beyond the body. Hydraulic tilt of the lift tower, 5 degrees in or out, adds a further safety factor.

One Traveloader attachment is a ram used for picking up, transporting, and stacking steel coils. Another is a special power-operated spindle on the lift tower for picking up spooled cable, then braking or reeling the spool as needed while cable is laid. Also available are double cranes for use with slings, hooks, and other rigging. These add 5 feet of working heights to the lift tower, according to the company.

All power is supplied by one rear-mounted engine, either gasoline or diesel. Power-boosted steering and hydraulic brakes are standard on all but smallest models. Equipment includes a full highway lighting system plus two adjustable spotlights for night work. The Traveloader is available in 10 models and three sizes: 3,000, 10,000, and 30,000-pound capacity.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 17.

Steel Welding Stand

A new lightweight steel stand for its portable and self-operating spot-welder has recently been introduced by Greyhound A.C. Arc Welder Corp., 606 Johnson Ave., Brooklyn 6, N. Y. When the welder is mounted on the stand, it becomes an efficient stationary model and foot-lever operation frees the operator's hands, according to the manufacturer. The unit can again be used as a portable device by removing the two metal brackets holding the portable spot-welder to the stand.

The Greyhound welding tool is available in both 110 and 220-volt ac models, 50-60 cycles. The steel stand is 36 inches high, 15 inches long, and 8½ inches wide. Weight is about 16½ pounds.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 98.

Cement-Treated Base For Secondary Road

(*Continued from preceding page*)

capacity of a concrete pavement, but it does provide a rigid-type pavement of good strength in between the regular concrete pavement and a soil-cement job where the cement is mixed with the soil of the road surface.

The major items included:

Roadway excavation	93,023 cu. yds.
Portland cement	4,312 bbls.
Cement-treated base	31,841 sq. yds.
Asphaltic-concrete surfacing	1,333 cu. yds.
Concrete for structure	490 cu. yds.
Reinforcing steel	80,990 lbs.
Structural steel	215,500 lbs.

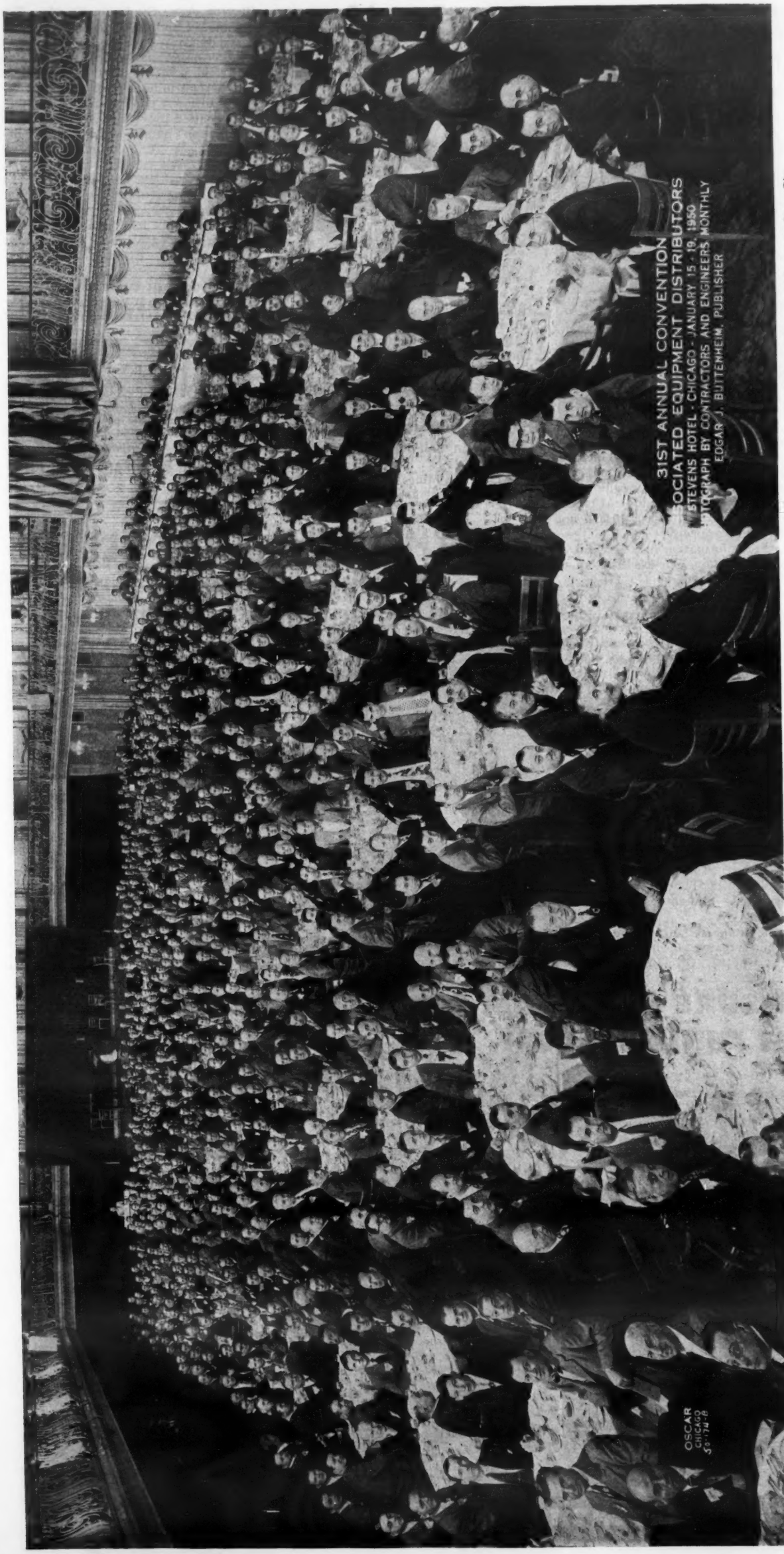
The Newark Asphalt Co. was represented by Fred Hull, Superintendent.

For the Ohio State Department of Highways, Raymond Strohl was Project Engineer, and Harris C. "Mark" Anthony was Laboratory Technician. The Department is headed by T. J. Kauer, Director; Louis Wismar is Chief Engineer of Construction.

Portable Lighting Lines

A bulletin describing portable light and tool lines has recently been issued by the Mines Equipment Co., a division of the Joy Mfg. Co., 4235 Clayton Ave., St. Louis 10, Mo. The String-A-Lite lines are designed to satisfy industry's need for easy-to-handle weather-proof assemblies of portable light and power outlets. The booklet includes portable lighting lines, portable tool lines, hand extension lighting lines, shatter-proof light sockets, power distribution centers, and safety switches. A 2-page section is devoted to applications. The catalog points out that these lines are for use where adverse climatic or particularly rough operating conditions prevail.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 52.



Attendance was heavy at the 31st annual meeting of the Associated Equipment Distributors, which opened on January 15 at the Stevens Hotel in Chicago, to discuss today's problems and tomorrow's profits.

Equipment Men Meet For the 31st Time

The 31st annual meeting of the Associated Equipment Distributors was held January 15-19 at the Stevens Hotel in Chicago. Open-forum panel discussions during the five days covered such live issues as rentals, trade-ins, inventories, sales training, financing, credits, collections, and the development and retention of markets for construction equipment.

Scheduled speeches included those by Walter L. Couse, Executive Vice President of the Associated General Contractors, Detroit, Mich., on "American Progress Through More Efficient Construction"; Clarence Y. Palitz, President of the Credit-America Corp., New York, on "Financing Equipment for the Year 1950"; Frank G. Knight, AED Executive Secretary, on "Tools for Shaping 1950 Business Success"; and Thomas S. Holden, President of the F. W. Dodge Corp., New York, on "Construction Trends Affecting the 1950 Outlook for Distributors". A full account of the discussions and speeches will be featured in the March issue of CONTRACTORS AND ENGINEERS MONTHLY.

Three business sessions were held during the meeting and presided over by W. W. Bucher, AED International President, of R. E. Brooks Co., New York; C. F. Halladay, AED Executive Vice President, of Halladay-Deltman Co., Sioux Falls, S. Dak.; and R. L. Arnold, AED Vice President and Director, Arnold Machinery Co., Salt Lake City, Utah. The election of 1950 officers took place at the third business session. A day and a half was left open during the convention for industrial distributor-manufacturer conferences.

Entertainment included the traditional Early Birds' Breakfast, sponsored this year by the AED members from New York and New Jersey; welcoming, installation, and farewell luncheons; the President's reception; and the 31st annual Birthday Party.

Folder on Truck-Crane And Highway Carrier Unit

A folder describing the multi-purpose Milford Crane-Truck, a combination truck-crane and highway carrier, is available from the Milford Crane & Machine Co., Milford, Conn. Bulletin No. 72 points out that handling and transportation costs are reduced by having a loading and unloading crane mounted directly behind the truck cab. The high-speed unit may also be used for rehandling materials from other trucks, trailers, freight cars, etc.

Specifications are given in the bulletin for the Model QX and the Model QY. Nominal ratings for these are 10 and 15 tons respectively; the travel speeds, 45 and 55 mph. The bulletin points out that the two-way cab enables a single operator to handle both driving and crane control—face forward for driving and turning around for crane operation. Front axles are interconnected by a patented equalizing arrangement to eliminate weight transfer and to insure correct spacing and alignment for steering.

All crane operations are powered from the truck engine. Hoisting and reverse-gear lowering of the load is also by power. Topping of the boom is by an independent power-reverse winch. Swing of the boom to either side is powered by a self-locking worm-gear unit. All the above operations can be performed either independently of one another or simultaneously, and with full load on the hook. An extra winch for auxiliary pulling independent of the crane can be provided as extra equipment. An electric magnet for handling scrap or a clamshell bucket for loose materials is available.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 121.

Basic Models Utilized For Technical Drawing

Technical drawing bulwarks engineering effort in many fields—manufacturing, processing, construction, public works, and transportation. The success or failure of a project is sometimes determined by how accurately and thoroughly engineering information is presented by drawings. High-standard technical drawings save time in interpretation, and reduce chances of expensive error at engineering, planning, and fabricating stages.

Bulletin No. 115, titled "Basic Models for Technical Drawing", issued by the Texas Engineering Experiment Station, College Station, Texas, covers the techniques for basic instruction in the use of technical drawings. It is limited to teaching-aid models. Often when one begins to search for models, he finds the supply somewhat limited and the quality frequently inferior. It is therefore often necessary to build one's own models to help students visualize the fundamental concepts of drawing. It is the purpose of this bulletin to show the details of construction of some of the more basic models.

This literature may be obtained gratis from the Experiment Station.

Exam Book Is Revised

"California Civil Engineer Registration Examinations and Their Solutions", by August E. Waegemann, has been published in a completely revised edition. It contains questions and solutions for all examinations given by the California State Board of Registration for Civil Engineers from 1940 to July, 1949, and the questions and answers for the California Civil Engineers-in-Training examinations. The California Civil Engineers Act is included in the book, as are the Professional and Vocational Regulations for engineers.

The book may be obtained by writing to August E. Waegemann, 2833 Webster St., San Francisco 23, Calif. The price is $5.00.

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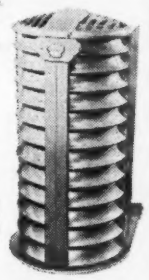

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